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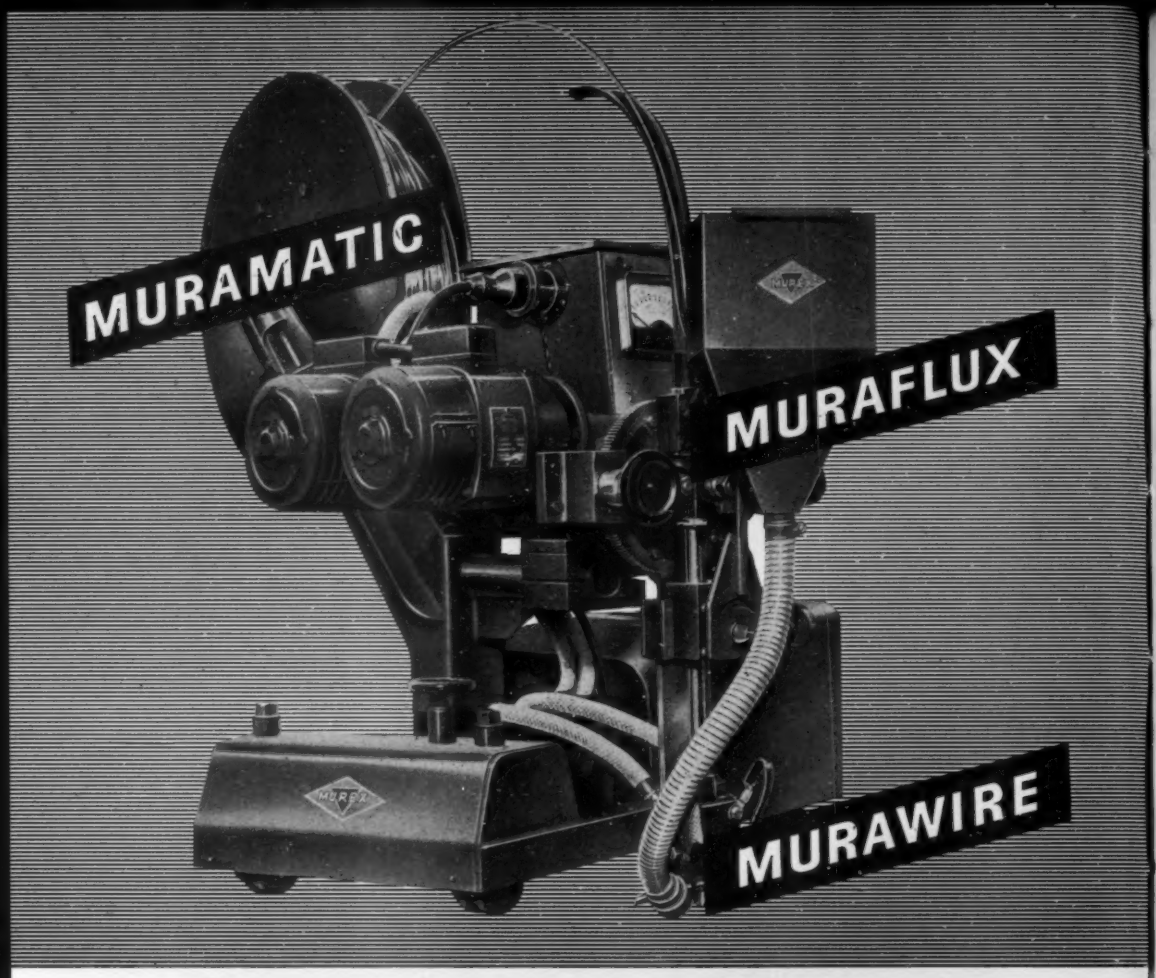

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IRON AND COAL
TRADES REVIEW

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German Steel

STEEL production in West Germany, including the Saar, totalled 29,400,000 tons in 1959, representing a doubling of production since 1950. While this is a record figure, pre-war production has now been exceeded by only about 9,000,000 tons. Over the past 20 years, the United Kingdom has shown a better performance, doubling the pre-war figure to reach just over 20,000,000 tons in 1959. The West German economy, on the other hand, has shown more dynamic expansion since 1950, when rehabilitation was pursued in earnest. Apparently, capacity of West German plants now approximates 34,000,000 tons, and several companies, including the leading producer, Dortmund Hörder Hüttenunion, A.G., and Klöckner-Werke, A.G., are contemplating substantial expansion programmes.

The German economy is in the process of being thoroughly liberalized and sections of the industrial structure at present State-operated are in the course of being handed back to private enterprise. So far as federal control of the iron and steel industry is concerned, this would appear to be the position in 1959: Iron ore, 36.7 per cent. under federal control; coal, 25.7 per cent.; coke, 16.5 per cent.; pig-iron, 5.8 per cent.; steel ingots, 5.1 per cent.

In 1958, the 10 leading companies accounted for over 70 per cent. of the crude steel production. Further, out of the 10 leading European producers in the ECSC, five were German enterprises, and included Dortmund, Phoenix, August Thyssen, Klöckner, and Rheinhausen. The eleventh, twelfth, and thirteenth were Mannesmann, the West German tube manufacturer, Hoesch, and Oberhausen. It is worth noting, in passing, that Dutch interests hold a controlling interest in both Dortmund and Klöckner, while the Flick complex of companies has substantial interests in French steel, particularly the Société des Aciéries et Tréfileries de Neuves-Maisons-Châtillon.

French steel production totalled 15,000,000 tons in 1959, revealing a substantial rise over the pre-war figure of 6,200,000 tons. A figure in the region of 18,000,000 tons is scheduled for next year. There is no escaping the fact that administrative interference on the level of prices has engendered friction between West German and French producers. This has apparently arisen out of the fact that the French have attempted to turn the European Economic Community structure to their national advantage. The Germans not unreasonably contend that the steps taken to inhibit the local industry from increasing prices have led to something like a 10 per cent. differential between French and West German basic-Bessemer steels. The immediate question that arises is how long the state of affairs will be allowed to continue.

A notable feature of the West German economy is, of course, the reconcentration of industry. In the chemical field, following the liquidation of I.G. Farben, steps have been taken to strengthen the constituent companies. A little time ago mergers appeared in the banking system. Many will clearly recollect that the dismantling of the German steel industry under Allied orders resulted in the dismemberment of the industrial assembly, Vereinigte Stahlwerke, into some 17 constituent companies. Already it would appear that the new pattern of industry reveals substantial regrouping. Rheinstahl Union-Maschinen-und Stahlbau, A.G., of Dusseldorf, with nine subsidiaries, and Rheinisch-Westfälische Essen-und Stahlwerk, A.G., with five subsidiaries have been merged in Rheinische Stahlwerks, A.G. (parent of Ruhrstahl, A.G., manufacturers of heavy plate in the Ruhr). The Dortmund Hörder Hüttenunion, A.G., the leading West German producer, has been substantially strengthened.

Although the merger of August Thyssen-Hütte, A.G. (flats, sections, and wire rods) and Phoenix-Rheinrohr, A.G. (tubes and plate) failed to materialize, due to the harsh conditions imposed by the ECSC High Authority, many believe that the plan for rationalization of the resources of both companies has only been deferred for a time. The combined production of the two groups would approximate 5,500,000 tons per annum, representing about 9 per cent. of the total ECSC production. It will be recollected that a controlling interest in both groups is at present held by members of the late Fritz Thyssen's family—Frau Amélie Thyssen (widow) and Countess Anita Zighy (daughter)—and therefore no question of control is involved.

As has been stated in these columns before, the Krupp interests have been expanded immeasurably, and as time advances the possibility of dismantling his coal and steel interests recedes. The acquisition of a majority interest in Bochumer Verein für Gussstahlfabrikation, A.G. (rails, sections, castings, forgings, and special steels), from the Swedish industrialist, Axel Wenner Gren, was recently completed with the sanction of the High Authority.

Both Mannesmann, A.G., Hoesch-Werke, A.G., and Klöckner-Werke, A.G., have been tightening their control over subsidiary companies. Six of Mannesmann's main subsidiaries have been merged in the holding company. They comprise iron-ore,

quarrying and bauxite, and coal affiliates, one tube manufacturing company, and two steel interests. Similarly, Hoesch has merged five of its wholly owned subsidiaries in the parent group.

The reassembly of West Germany's steel units is now becoming a fact, and it looks as though the new Germany is making a bid to dominate this section of the Common Market.

Head Wrightson Presentation

RETIREMENT on January 31 of Mr. Richard Miles, chairman and managing director of Head Wrightson & Company, Limited, engineers, and iron and steel founders, of Thornaby (Yorks), was recently marked by a presentation by the board, staff, and workers, at the company's Thornaby headquarters.

MR. RICHARD MILES

Mr. Miles joined the company in 1932 and was chairman and managing director for 10 years. He served on a number of national committees, including the Institute of British Foundrymen, the Federation of British Industries, the British Steel Founders Association, the British Engineers' Association, and the British Welding Research Association, and was a director of the Nuclear Power Plant Company, Limited, the National Research Development Corporation, the F. C. Construction Company, Limited, and a number of home and oversea Head Wrightson subsidiaries.

In his farewell speech, Mr. Miles said that Head Wrightson was today very soundly based. "Without any spectacular take-over bids during the last generation, the turnover has gone up from under £500,000 to £20,000,000, and from losses up to approaching £2,000,000 trading margin."

Russians to Visit Scottish Wire Rope Factory

FOUR members of a Russian trade delegation are to visit the works of Martin, Black & Company (Wire Ropes), Limited, wire rope manufacturers, of Coatbridge, near Glasgow, for four days from June 22. It is the only visit north of the border being made by the Russians, two of whom are wire rope experts, the two others being chiefly concerned with wire.

At Coatbridge they will see wire rope making machinery, and also inspect and study the wire drawing process of Martin, Black's associate company, the Speedwell Wire Company, Limited.

Martin, Black now exports more than 40 per cent. of its output to 62 countries, including Russia. Mr. George A. Black, export director, said the visit would be followed by one to Russia by a Martin, Black director.

Industry Optimistic in F.B.I. Survey

WHILE shortage of labour, particularly of skilled labour, is becoming more acute, and costs are rising, the general mood of confidence in industry is unimpaired as output and orders continue generally to rise, according to the latest survey by the Federation of British Industries.

Attention is now being directed more closely, however, to factors tending to limit further expansion, and of these the most commonly mentioned is shortage of labour. Two out of every five of the 714 companies which answered the FBI's questionnaire said that it was less easy to obtain labour than it was four months ago at the time of the last inquiry. Industries most affected by shortage of skilled labour and materials are on the whole the engineering and vehicle groups which have largely been working to capacity level.

The eighth FBI inquiry of its kind, it is the first in which a question has been put about causes which could hamper production. Lack of orders, inadequate plant capacity, and shortages of materials were factors singled out by a sixth of the companies.

Biggest change in the pattern of answers occurs with the question of costs. Four months ago, only 25 per cent. said that average costs per unit had risen and more than half said they had been unchanged. Now, at the beginning of this month, 47 per cent. reported higher costs and only 41 per cent. find them unchanged. Since raw material prices have been fairly stable in the interval, wage increases and the shorter working week in many industries seem to be the main elements in cost increases.

Although two thirds of the companies still say that average selling prices are the same as four months ago, the percentage revealing increased prices has risen from 12 to 22. With costs rising, there has been a significant increase—from 31 to 38 per cent.—in the number reporting that average profit margins per unit have risen, but half the answers indicate that there has been no change.

In general, answers reflect the rise in industrial production of the past few months, with increases (on balance) in new orders, output, stocks of material, and of work in progress. A smaller percentage shows an increase in optimism about the general business situation.

As in previous surveys, the evidence of a rise in orders and deliveries for export is less strong than the evidence of an improvement in the home market, but there has been no important change in the numbers reporting exports rising—or falling.

SCOW Shows Increased Sales and Profits

DEVELOPMENT programmes of the Steel Company of Wales, Limited, are now beginning to bear fruit. Sales in the 26 weeks to April 2 were £70,900,000, compared with £125,500,000 for the 53 weeks of 1958-59 an increase of 13½ per cent. on the annual rate. These figures easily support the rise in the interim dividend from 3¼ to 5 per cent.

The main cause of the rise was the increase in output resulting from the third development plan, which raised capacity to 3,000,000 tons a year against last year's output of 2,324,000 tons. Another factor was that prices of sheet metal were not reduced when those of most other types of steel were.

MR. ALFRED ROBENS

Named as Coal Board's Next Chairman

WHAT is thought in many quarters to be the most serious blow the Labour Party has suffered for a long time is the appointment of Mr. Alfred Robens, the party's spokesman in the House of Commons on industrial matters, to succeed Sir James Bowman as chairman of the National Coal Board. Mr. Robens' appointment will mean his leaving Parliament, and therefore, the loss to his party of one of the senior members of its "Shadow" Cabinet. The news was confirmed yesterday (Thursday) by the Minister of Power, Mr. Richard Wood, during his tour of South Wales steelworks and collieries.

The Minister announced that Mr. Robens had been appointed a deputy chairman of the NCB with effect from October 1. He will succeed Sir James when the latter's term of appointment expires on January 31, 1961. Mr. Robens will, therefore, have four months with Sir James.

With him, also as a deputy chairman, will be Mr. E. H. Browne, chairman of the West Midlands Divisional Coal Board. The Minister states that Mr. Browne's appointment will date from September 1 when Sir Joseph Latham's resignation takes effect.

Knowledge of Fuel and Power

Mr. Robens, who is 49, has been Labour MP for Blyth since the 1950 redistribution, having before that represented for five years the Wansbeck Division of Northumberland. For four years (until 1951) he served as Parliamentary Secretary to the Ministry of Fuel and Power and was then made Minister of Labour in April, 1951, until the following October.

His extensive knowledge of trade unionism dates from 1935 when he became an official of the Union of Distributive and Allied Workers and he served as a Manchester City Councillor from 1942 to 1945. Earlier this year he accepted an appointment as labour relations adviser to Atomic Power Constructions, Limited.

Mr. Browne, who is 49, was educated at Cambridge where he obtained his MA degree and at Birmingham University where he obtained his mining degree. He was successively manager of Chanters Colliery, mining agent, chief mining agent, and a director of Manchester Collieries, Limited. He was appointed production director of the North-Western Division of the NCB on vesting date, director-general of production in 1949 and West Midlands' chairman in 1955.

No official confirmation or denial has been made of the widely-rumoured appointment of Mr. Harold Bowman to succeed Mr. Thomas. Mr. Bowman has had association with the sewing machine and metal window frame industries. His "appointment" has already given rise to criticism as bringing someone into the industry who has no experience of its particular problems at a time when the drive to promote solid fuel is at its height.

Making his announcement, at Cardiff, the Minister said that he had come to a three-point agreement with Mr. Robens. The points were:— There would be no denationalization of the coal industry; they had agreed to work together to make the nationalized coal industry as efficient as they possibly could; they would continually examine whether any changes ought to be made in order to ensure the maximum efficiency of the coal industry.

Mr. Wood said he had invited Mr. Robens to be chairman of the board because he felt he was the best possible chairman the industry could have. Mr. Wood refuted suggestions that political strategy was involved.

Yesterday (Thursday) Mr. Robens made it clear that he would shape his own policies for the industry and would not be distracted by threats from the miners' unions. Asked if he would be a party to decentralization plans he said there were bound to be some changes in the structure of the industry because its requirements had changed very considerably.

"I shall put forward no changes until I have had plenty of opportunity to see what can be done," said Mr. Robens. "My aim is the improved efficiency and prosperity of the industry, bearing in mind the social consequences associated with its policies and the fact that many thousands of people and their families depend upon it." What the miners feared, he said, was that every district would have different price and wages structures. Anyone who had seen his speeches throughout his life would hardly think it likely he would condone such changes.

On decentralization Mr. Robens said he was not against the devolving of authority from the centre to the periphery. He believed that as far as possible the command should be close to the scene of production.

The news was received with mixed feelings by miners. From Mr. Robens' "territory," Northumberland, the Area Secretary of the NUM, Mr. Robert Main, in a radio and television broadcast, said he thought Northumberland miners would accept the appointment. Mr. Robens, who was a man of integrity, would keep the miners' interests in heart and mind.

Mr. J. Bullock, president of the British Association of Colliery Management, stated on Wednesday that he had written in protest to the Minister. "While managements have no objection to Mr. Robens personally," he said, "we have a great objection to the fact that the Government should see fit to say there was no one good enough in the industry for the position."

For the Scottish Area of the NUM, Mr. Abe Moffat, president, said in Edinburgh that if Mr. Robens operated the Government's reactionary policy he would meet with the strongest opposition from miners all over Britain.

Following a meeting of the NUM executive yesterday (Thursday), the union's vice-president, Mr. Ted Jones, warned that industrial action might be taken if the Government attempted to decentralize the coal industry. A resolution to this effect was passed by the executive.

Passing Thoughts . . .

IF you suspect we are living in the past, forget it. We simply like to carry our history with us as we face the uncertain future. It is comforting to feel that we have overcome great challenges in the past and it helps us to keep revolutionary changes of the modern world in their proper perspective.—Duke of Edinburgh opening the British Exhibition in New York.

The amount we have to sell for export must, to a large degree, depend upon the development of power in what are described as under-developed countries. Here we run into the sordid subject of money.—VISCOUNT CHANDOS, *in his presidential address to the British Electrical Power Convention.*

Whatever way one looks at it, it seems that shipbuilding will both contract and concentrate, and, in doing so, a far healthier industry should emerge.—Sheffield Telegraph.

The salvation of British shipbuilding does not lie in combining the little shipyards into big units.—COL. R. A. BARTRAM, *chairman of Bartram & Sons, Limited, Wear shipbuilders.*

Equality, whatever its form, is non-existent while one man's security and personal welfare is still dependent on another's unrestricted decision.—MR. JAMES LARKIN, president of the Irish Congress of Trade Unions.

Dismissals may entail "economic, personal, and family tragedies"; but enforced retention of idle, bad, or surplus employees may entail economic disaster to unsheltered industries and to all dependent on them.—Newcastle-upon-Tyne Journal.

Abuses of power by lock-outs have long been outlawed by public opinion; so must strikes for the same good reasons. They are the unhealthy symptoms of our antiquated industrial system which needs the strong winds of change.—SIR ROBSON BROWN, MP, in a letter to the Daily Telegraph.

If the right to strike is the inalienable safeguard of the worker then surely the right to dismiss is equally that of his employer.—Western Mail.

Most Canadians would have laughed at the suggestion that we could export steel to Britain. But it is now expected that we will export 150,000 tons of billets this year and another 50,000 tons of hot and cold rolled sheet steel and iron rods. In addition there will be the continuing sale of steel alloys.—MR. GEORGE DREW, Canadian High Commissioner in London.

Steelmakers are entitled to point out that if industrialists had not run down their stocks so far during the recession they would not be encountering so much difficulty in rebuilding them now.—Financial Times.

There are crisis days ahead in coal. The Government is planning to split the industry into its separate coalfields and to let them compete against each other for the available markets.—Daily Herald.

The coal industry faces years of difficult adjustment to increasing competition from other fuels, and no industrial management has a harder task than that which lies before the National Coal Board.—The Guardian.

Decentralization . . . far from being the ruin of the [coal] industry, could be its salvation and restore at least part of it to the prosperity nationalization failed to bring. Competition would eliminate the unprofitable and help the valuable areas, such as South Wales.—Western Mail.

The way in which the coal industry is developed over the next decade will have a decisive influence on Britain's economic future—The Times.

The news that Mr. Alfred Robens, a key member of Labour's Shadow Cabinet, has accepted the Government's invitation to succeed Sir James Bowman as chairman of the National Coal Board, an appointment which must inevitably take him out of the arena of party politics for good, is the most serious and in some ways the most unexpected of the many blows which the Labour Party has suffered in recent months.—Yorkshire Post.

If Mr. Robens has been chosen, is the choice a wise one? It could be the means of taking the industry out of politics. And what greater benefit could be conferred on it than that?—Sheffield Telegraph.

Changing conditions dictate new thinking in the industry. Mr. Robens is capable of it; but he would be likely to find the job, even as Sir James has found it, tough, frustrating, and thankless.—Newcastle-upon-Tyne Journal.

The implication that there is not sufficient ability within the coal industry to fill its top jobs must be disastrous for morale.—Daily Telegraph.

If something is not done soon, we shall have a generation of casual labourers on our hands, with all the dreadful possibilities that can arise from such a situation.—MR. J. W. MANSELL, Department of Electrical Engineering, Reading Technical College, in a letter to The Times.

Britain's "Platonic" Offer to Join ECSC

BRITAIN'S offer to join the European Coal and Steel Community and Euratom was rather a "platonic gesture," and the six countries of the Common Market were waiting to see what action would follow, said Dr. J. Luns, Dutch Foreign Minister, at a luncheon of the Anglo-Dutch Trade Council in London on Monday.

Dr. Luns, who is chairman of the 20-nation Trade Committee which met in Paris last week, said it was a "first gesture," and as such important. Even those on the Continent who felt that the offer did not go far enough would embark on serious discussion on it if it were put formally.

There was no prospect at the moment of negotiating a long-term solution between the Six and Seven, he said, but there was a growing realization on all sides that the climate which would make an eventual association between the Common Market and EFTA possible should be preserved.

Replying to Dr. Luns, Mr. D. Heathcote Amory, Chancellor of the Exchequer, expressed his disappointment that the Six did not feel that the time was ripe for a further move towards "long term partnership in a single Europe-wide market." For the present, the Six and Seven should remain in close and friendly touch so that no opportunity of a move forward should be lost.

IRONWORKS is to be built by a West German company near Shaka, on the Lebanese coast, at a cost of about £3,250,000. The Lebanese Government will receive 5 per cent. of all profits.

Threat to Coal

MINERS WARNED OF DENATIONALIZATION PLANS

ATTACKS on the Government's attitude towards coal were made at opposite ends of the country last weekend. Addressing thousands of miners in Cardiff at the seventh annual gala organized by the South Wales Area of the NUM, Mr. Will Paynter, national secretary, accused the Government of "a general plan to dismantle nationalization in the coal industry." Speaking to Northumberland miners, Mr. E. Jones, vice-president of the union, maintained that "but for the stubborn opposition of the Coal Board there would have been overtures already to denationalize coal."

Stating that "this is no time to experiment in the appointment of persons with no experience of nationalized industry and scanty knowledge of the complexities surrounding coal sales at the present time," Mr. Paynter alleged that the Minister of Power was appointing someone from outside the industry to take over from the retiring marketing director, Mr. R. H. E. Thomas. Mr. Paynter saw in this a deliberate attempt to weaken the board's recent marketing drive againt fuel oil.

He went on to say that under the Government's plan to permit Parliament to debate capital spending programmes for the nationalized industries the investment programme of the NCB would be determined by political factors.

Realistic Planning Impossible

This new move, he declared, could result in ruin. Future planning and development could be frustrated by people whose approach was mostly determined by consideration of party advantage and whose ignorance of the industry and its problems, judged by past performance, was colossal. Realistic planning would be made impossible unless the board could be assured in advance that the necessary capital was forthcoming.

Government plans for decentralization, Mr. Paynter continued, would mean "the creation of a situation where coalfield will be competing against coalfield for available markets within Britain. It can mean the destruction of everything nationalization stands for in the coal industry."

Mr. Will Whitehead, president of the South Wales NUM, believed that the Tories were determined to break down the "last stronghold of nationalization" and foresaw an attempt to do away with the national minimum wage by re-establishing separate wage negotiations in separate districts.

ECSC COAL OUTPUT RISES AGAIN

PRODUCTION of coal in the European Coal and Steel Community in May was 19,598,000 metric tons, against 19,062,000 tons in April and 17,875,000 tons in May, 1959. The May total brought output for the first five months of the year to 99,533,000 tons—0.7 per cent. above the total of 98,857,000 tons in the same period of 1959.

Stocks of coal at pitheads continued the slow rise noted since the end of February, and by the middle of May had reached almost 31,800,000 tons, compared with 30,400,000 tons at the end of February and 30,600,000 tons at the end of May, 1959.

Only 104 Scottish Miners Jobless

ONLY 140 miners in Scotland are still without jobs as a result of pit closures. This figure is given by the Scottish Divisional Coal Board following completion of an 18-month programme involving the closure of some 40 Scottish pits affecting 8,000 men. Practically all these men have been found jobs at other pits within travelling distance of their homes.

There has been a considerable upswing in the rate of finding alternative work for displaced miners. Last December the Coal Board announced that there were 360 men still out of work after a year that had seen nearly 30 Scottish pits closed, involving some 5,000 men. There had been signs that the men were being placed more easily as the last pits were closed.

Since December the board has carried out another round of closures in Scotland. Ten pits have been shut down in six months, affecting 2,400 men. Redundancy has been limited to 40, while at the same time progress has been made with the re-employment of men outstanding from 1959.

"There are less than 100 miners who were displaced during 1959 still unemployed," said a spokesman for the board in Scotland on Monday. "With this year's closures we were very successful with the first nine shut-downs—out of 2,000 men only one has still not been re-employed. Twelve days ago we closed Greenrigg Colliery, near Fauldhouse (Lanarkshire), and of the 380 men there, 39 are still not placed."

He pointed out that Greenrigg was in an area where alternative employment in collieries was hard to find, yet some 90 per cent. of the men had been placed.

South-Western NCB Estates Manager

FORMER estates manager of the Swansea and Neath Areas of the South-Western Divisional Coal Board, Mr. B. Talwyn Evans, has been appointed divisional estates manager. His appointment follows the recent death of Mr. J. F. Bateman.

Mr. Evans was educated at Neath Grammar School and the Treforest School of Mines. He is a Fellow of the Royal Institution of Chartered Surveyors and before nationalization was surveyor and minerals manager with Evans & Bevan, Limited, the Neath colliery owners.

Appointments

Dr. W. E. Harris for Marketing Post

FOLLOWING the retirement of Sir Peter Beauchamp as deputy marketing director of the South-Western Divisional Coal Board, Dr. W. E. Harris has been appointed to succeed him. Since 1955, Dr. Harris has been assistant general manager of the No. 6 (Monmouthshire) Area, before which he was divisional chief scientist at the NCB laboratories at Tredomen.

Dr. Harris, who is 54, was educated at Newport High School and the University College, Cardiff. He holds B.Sc. and Ph.D. degrees, is a Fellow of the Institute of Fuel, and an associate of the Institute of Chemistry. He was on the staff of the Coal Survey Laboratory in Cardiff of the Department of Scientific and Industrial Research from 1931 to 1946 and, until taking up his NCB appointment in 1948, was officer in charge there. He served as a member of the South Wales Fuel Efficiency Committee during the war and has wide experience of pits in the division.

Mr. A. H. DU VERGER has been appointed publicity manager of the Cement Marketing Company, Limited, London, S.W.1, the selling organization of the Blue Circle group of cement companies.

After three years as manager of Bankfoot Coke Works (Co. Durham), Mr. H. BLAIR has been appointed manager of the Trimdon Coke Works. Mr. CHARLES TAYLOR, assistant manager at Bankfoot, has succeeded Mr. Blair.

On the retirement of Mr. F. Payne, technical services director of the Cement Marketing Company, Limited, London, S.W.1, the following appointments have been made:—Development division, general manager, Mr. H. A. HOLT; chief technical adviser, Mr. K. H. BRITTAIN; special products division, general manager, Mr. J. W. WHALLEY; whiting division, general manager, Mr. H. H. MARSHALL.

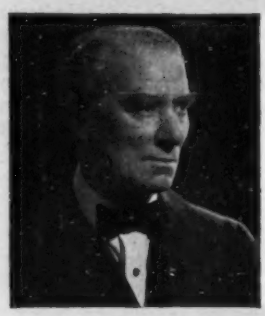
Mr. J. E. BISHOP has been appointed general sales manager of the Pulsometer Engineering Company, Limited, and of its subsidiary, Joseph Evans & Sons (Wolverhampton), Limited, manufacturers of pumps, etc. He received his training with Gwynnes Pumps, Limited, and was with the Permutit Company, Limited, and Worthington Simpson, Limited, before becoming sales manager with Sigmund Pumps, Limited, and subsequently general manager of Lee Guinness, Limited.

Two oversea appointments have been announced by Armstrong Whitworth (Metal Industries), Limited. Mr. WILLIAM MCK. WRIGHT has been made resident area sales manager in the Middle East, in which position he will develop the sales of the company's Closeloy rolls, Kue Ken crushers, A. W. Overstrom screens, and general engineering products. Mr. GUY CHESHAM, formerly an official with the Machine Tools Trade Association, has been appointed special representative to the Soviet Bloc.

After many years as manager of the machinery department (southern area) of Thos. W. Ward, Limited, Mr. W. S. CLIFFE retires from the post on June 30. He began his career in the company's head office at Sheffield in 1913 and was for seven years responsible for the Midlands area before coming to the London office. He will continue to serve in an advisory capacity until the end of the year. He is succeeded by Mr. C. R. HARKCOM, formerly general manager of the company's Indian subsidiary in Bombay.

United Steel's Interim is Raised by 2 Per Cent.

GROUP sales of the United Steel Companies, Limited, for the 24 weeks ended March 12, 1960, totalled £63,155,000. The interim dividend on the £30,000,000 ordinary capital is being raised by 2 per cent. to 6 per cent. The details are given by the company, of which Sir Walter Benton Jones is the chairman, in its first ever interim report.



SIR WALTER BENTON JONES

For the previous full year to September 30, 1959, sales amounted to £109,480,000, while the figure for 1957-58 was £122,040,000. Trading profit for the 24-week period was £10,479,000, compared with £17,648,000 for the previous 12 months and £16,732,000 for 1957-58. The figures, subject to audit, have been struck after depreciation, but before charging debenture and loan interest and before providing for the transfer to fixed assets, replacement reserve, and tax.

The board states that the current result reflects the high rate of activity being achieved both by the company and by the industry as a whole, and also the benefits of capital expenditure in recent years. The level of demand and volume of orders on hand suggest that this rate will continue for the remainder of the financial year, subject to the normal interruption always experienced in the summer from works holidays which cause some reduction in the rate of earnings.

Colville's Half-year Profit Nearly Doubled

CONSOLIDATED net profits of Colvilles, Limited, almost doubled from £2,072,000 to £4,082,000 in the six months ended March 31, 1960. The balance is after a similar depreciation charge of £1,214,000 and tax of £2,648,000 (£1,862,000). Interim dividend is repeated at 6 per cent. on an ordinary capital increased by £3,540,520 to £13,915,116 by debenture conversions. Total for the year ended September 30, 1959, was 14 per cent.

In the half-yearly results no allowance is made for any transfer to capital reserve by way of additional depreciation for replacement costs. Group output of coke rose from 251,082 to 302,671 tons, pig-iron from 344,256 to 442,276 tons, and steel ingots and castings from 705,246 to 1,036,374 tons. Demand for all classes of steel has strengthened, state the directors, and in most sections capacity is fully employed. Good progress is being made with the construction of the strip mill development scheme. Expenditure is now steadily rising, but no call has yet been made on the loan arranged with the Government.

The death has occurred of Mr. SYDNEY WAILES, of County Durham, at the age of 73. He had been connected with the mining industry for 40 years as a mineowner, exporter, and latterly as a coal merchant.

Birthday Honours

THERE is less emphasis on industry and commerce in the 1960 Birthday Honours List and more upon arts and learning. The list—some 2,200 names—is slightly shorter than usual. Details of some of the principal awards with biographical notes on the recipients are given below.

VISCOUNT

Field Marshal Sir WILLIAM SLIM, a director of Imperial Chemical Industries, Limited, and other companies, and lately Governor-General of Australia.

BARON

Mr. BASIL SANDERSON, chairman of Shaw Savill & Albion Company, Limited, and other shipping companies, and a director of the Bank of England, the Finance Corporation for Industry, Limited, the Ford Motor Company, Limited, Furness, Withy & Company, Limited, and George Thompson & Company, Limited.

BARONET

Sir KENNETH DUGALD STEWART, a director of the Manchester Dry Docks Company, Limited, and the Manchester Ship Canal Company.

KNIGHTS BACHELOR

Mr. PERCY LLEWELLYN HUNTING, chairman of the Hunting group of aircraft companies and a director of a number of other companies.

Mr. WILLIAM HUNTER MCFADZEAN, chairman of British Insulated Callender's Cables, Limited, and president of the Federation of British Industries. Mr. McFadzean was appointed to the board of BICC in 1945 and was elected chairman in 1952. He is also chairman of British Copper Refiners, Limited.

ORDER OF THE BATH

CB

Mr. OWEN FRANCIS, Under-Secretary, Ministry of Power.

ORDER OF ST. MICHAEL AND ST. GEORGE

CMG

Mr. ARTHUR FRANKLYN WILLIAMS, Assistant Secretary, Ministry of Power.

ORDER OF THE BRITISH EMPIRE

Civil Division

CBE

Mr. THOMAS EDWARD ALLIBONE, director of the research laboratory of Associated Electrical Industries, Limited, Aldermaston, and a director of Siemens Edison Swan, Limited, member of the council of the British Electrical and Allied Industries Research Association, member of the industrial grants committee of the Department of Scientific and Industrial Research, and of the DSIR Mechanical Engineering Research Laboratory Board.

Col. GEOFFREY GEORGE HARGREAVES BOLTON, chairman of the North-Western Divisional Coal Board since 1951 and prior to that its marketing director since vesting date. Col. Bolton, who is 65, has been associated with the coal industry since 1912. He was a director of Hargreaves Collieries, Limited, from 1932 until the nationalization of the industry and was executive officer of Lancashire Associated Collieries from 1935 to 1946. He served in the first world war and was awarded the MC in 1916 and commanded the Territorial regiment, the East Lancashire Regiment, from 1920 to 1928.

Mr. EDMUND THOMAS CHARLES GRINT, chief labour officer, Imperial Chemical Industries, Limited.

Mr. ERNEST JOHN HUNTER, chairman of Swan, Hunter, & Wigham Richardson, shipbuilders, etc., of Wallsend-on-Tyne, and a director of the Glasgow Iron & Steel Company, Limited, Barclay Curle & Company, Limited, Wallsend Slipway & Engineering Company, Limited, and a number of other companies and a director of the British Shipbuilding Research Association.

Mr. WILLIAM GREENWOOD MITCHELL, a director of Mitchell Bros., Sons & Company, Limited, civil engineering contractors, of London, S.W.1.

Mr. REGINALD STATHAM, head of Statham & Company, accountants of Newcastle (Staffs), and secretary for many years of the North Staffordshire Federation of Small Mines.

OBE

Mr. FRANK WILLIAM BATES, works director of Kelvin & Hughes, Limited, engineers, of Barkingside (Essex).

Mr. ROBERT JAMES CLAYTON, manager of the applied electronics laboratories, General Electric Company, Limited; Prof. ALEXANDER LAMB CULLEN, Professor of Electrical Engineering at the University of Sheffield since 1955 and formerly lecturer in electrical engineering at University College, London.

Mr. GEORGE MONTAGUE HARVEY, managing director of British Oxygen Wimpey, Limited; Mr. GERALD EDWARD HOWLING, lately principal of the mineral resources division, Geological Survey, Colonial Office.

Mr. HUGH MILLER, principal of Shaw-Petrie, Limited, pipe and pipeline engineers, of Hillington, Glasgow, and consultant adviser to Clyde Tube Forgings, Limited.

Mr. LEONARD PATRICK, head of the Government contracts department, Imperial Chemical Industries, Limited; Mr. ROBERT GIBSON PRENTER, director of MacTaggart, Scott & Company, Limited, marine, hydraulic, and general engineers, of Loanhead, Edinburgh.

Mr. HUGH RIGBY ROWBOTHAM, chairman and managing director of Joshua Bigwood & Son, Limited, engineers and manufacturers of steelworks plant, of Wolverhampton, and a director of Butro Jig & Engineering Company, Limited, International Unicalor Company, Limited, and Traughber Filter Company, Limited; Mr. JAMES GORDON RUFFELL, manager of the repair department, John I. Thornycroft & Company, Limited, marine engineers, shipbuilders, etc., of London, S.W.1.

Mr. FRANK HENRY SANITER, director of research, United Steel Companies, Limited, a vice-president of the Iron and Steel Institute, and a member of the council of the British Iron and Steel Research Association.

Mr. FERDINAND BERNARD THOLE, lately principal scientific officer, Ministry of Power; Mr. ERNEST FREDERICK THOMPSON, director and general manager of B.S.A. Guns, Limited; Mr. ERNEST ARTHUR TIMSON, managing director of Timsons, Limited, makers of boot and printing machinery, ironfounders, etc., of Kettering (Northants).

MBE

Mr. JOSEPH HARLING TURNER BORLAND, chief designer, Glenfield & Kennedy, Limited, valve manufacturers

and hydraulic engineers, of Kilmarnock (Ayrshire); Mr. ARCHIBALD JOSIAH BUXTON, senior executive officer, Ministry of Power; Mr. GEORGE ARTHUR CAIN, assistant manager of C. & H. Crichton, Limited, ship-repairers and engineers, of Liverpool.

Mr. DAVID NEWMAN JAMES COLE, chief engineer draughtsman, Vosper, Limited, shipbuilders' engineers, of Portsmouth; Mr. WILLIAM JOSEPH CROOKS, production manager, Aberdare Cables, Limited, manufacturers of electric power cable and copper wire, of Aberdare (Glam); Mr. HAROLD DENMAN, technical representative of Moorwoods, Limited, ironfounders, makers of ranges, stoves, etc., of Sheffield; Mr. SAMUEL GEORGE FORSYTH, export manager, Ford Motor Company, Limited; Mr. LEONARD GODBER, local director and general manager of Newton Chambers & Company, Limited, ironfounders, engineers, chemical manufacturers, etc., of Thorncliffe, near Sheffield, and the company's first personnel manager; Mr. WILLIAM ROBERT GROVES, superintendent, Short Bros. & Harland, Limited, aeronautical engineers, of Belfast.

Mr. JACK HARPER, chief liaison officer, Admiralty contracts, Heenan & Froude, Limited, manufacturing engineers, of Worcester; Mr. JOHN WILLIAM HICKEY, works manager, C. H. Bailey, Limited, shiprepairers, drydock owners, etc., of Newport (Mon); Mr. JOHN HODGE, chairman of the Ayr and Dumfries Collieries Savings League; Ald. THOMAS VINCENT KEELAN, assistant education officer of the plastics division, Imperial Chemical Industries, Limited; Mr. KENNETH GRENVILLE LLOYD, chief export estimator and a deputy director of John Thompson Water Tube Boilers, Limited; Mr. ERNEST GEORGE LONGMAN, executive director, the Hoffman Manufacturing Company, Limited, makers of ball and roller bearings, etc., of Chelmsford (Essex).

Mr. DENNIS AMBROSE NEILL, director of Smart & Brown (Engineers), Limited, precision machine-tool makers, etc., of Spennymoor (Co. Durham); Mr. FRANK JOHN PERKINS, higher executive officer, Ministry of Power; Mr. HERBERT RADFORD, dock master, Cammell Laird & Company (Shipbuilders & Engineers), Limited, Birkenhead; Mr. MERVYN GEORGE SMITH, divisional manager, mechanical automation division, Elliott Bros. (London), Limited, makers of instrumentation and automatic control equipment, of London, S.E.13.

Mr. SAMUEL THOMPSON, senior assistant engineer, Appleby-Frodingham Steel Company, branch of the United Steel Companies, Limited, Scunthorpe (Lincs); Mr. JOSEPH MORDUE TODD, lately manager of North Walbottle Colliery, Northern (N&C) Division of the National Coal Board; Mr. CHARLES VEDRINES WADDELL, electrical engineer, Cowans Sheldon & Company, Limited, engineers, crane builders, ironfounders, etc., of Carlisle; Mr. JAMES ROGERSON WIGHT, electrical manager, Scotts' Shipbuilding & Engineering Company, Limited, Greenock.

BRITISH EMPIRE MEDAL

Mr. FREDERICK CHARLES ACKERMAN, foreman propeller pattern-maker, J. Stone & Company (Charlton), Limited, London, S.E.6; Mr. JOHN GOODWIN ANDERSON, assistant foreman electrician, Vickers Armstrongs (Shipbuilders), Limited, Barrow-in-Furness; Mr. ALFRED CHARLES VICTOR BAKER, foreman of model shop, E.M.I. Electronics, Limited, Greenford (Middx); Mr. GEORGE BAKER, foreman corebuilder, Associated Electrical Industries (Rugby), Limited; Mrs. LILIAN MAY CORNWALL, senior chargehand, electronics group, Plessey Company, Limited, Chadwell Heath; Mr. JAMES CUTHBERT, head foreman fitter, Austin & Pickersgill, Limited, Sunderland; Mr. WILLIAM HENRY DIXON, shop foreman fitter, T. R. Dowson & Company, Limited, South Shields; Mr. FRANCIS DUGGAN, glazier, the Mond Nickel Company, Limited, Swansea.

Mr. JOSEPH BRADFORD GRIEVES, checkweighman, Dudley Colliery (Northumberland); Mr. PETER HASTIE, mechanization team leader, Scottish Division Coal Board; Mr. WILLIE HAWKSWORTH, power loader operator, Rockingham Colliery, Barnsley (Yorks); Mr. GEORGE HENRY JOHNSON, shearsman, the Steel Company of Wales, Limited, Port Talbot; Mr. HENRY KISBY, deputy overman, Wearmouth Colliery, Sunderland; Mr. DAVID JOHN LEWIS, salvage and economy officer, Cwmgwrach Colliery, Aberdare.

Mr. JAMES MCDONALD, foreman boilermaker, Drypool Engineering & Dry Dock Company, Limited, Hull; Mr. ARTHUR MEAD, check measurer, Kirkby Colliery, Kirkby-in-Ashfield; Mr. GEORGE EDWIN MORSE, collector, works and staff savings groups, Doncaster Wagon Company, Limited, Doncaster; Mr. RICHARD VIVIAN NELMS, pitman, Abercynon Colliery, Mountain Ash; Mr. CHARLES LESLIE OAKES, assistant technical officer (engineer), Imperial Chemical Industries, Limited, Redcar; Mr. FRANK RODGERS, chief medical room attendant, Treeton Colliery, Treeton (Yorks); Mr. GEORGE THOMAS ROWE, chargeman, J. I. Thornycroft & Company, Limited, Southampton; Mr. JAMES SCRETON, foreman painter and scaler, Amos & Smith, Limited, Hull; Mr. JAMES BELFRIDGE TAYLOR, turner, Cammell Laird & Company (Shipbuilders and Engineers), Limited, Birkenhead; Mr. JOHN ELLIOTT TWEDDELL, chargeman, A. Reyrolle & Company, Limited, Hebburn; Mr. WILLIAM JOHN WHITBY, foreman, Botax, Limited, Greenford (Middx); Mr. JOHN OWEN WILLIAMS, hooker and pump attendant, Maenofferen Slate Mine, Merioneth.

AMEME's New President

NEW president of the Association of Mining Electrical and Mechanical Engineers, Mr. Albert E. Crook, took office at the annual general meeting of the association in Blackpool on Tuesday. Mr. Crook, who is 59, is chief engineer, production department, National Coal Board headquarters.

MR. A. E. CROOK

Before the nationalization of the mines, he spent 28 years in the industry as an engineering apprentice, draughtsman, engineer, and assistant chief engineer. He was employed by the Pearson & Knowles Coal & Iron Company, Limited, and later by the Wigan Coal Corporation, Limited.

In 1944 Mr. Crook was appointed the first Inspector of Mechanical Engineering in Mines, since when he has developed the mechanical engineering section of the Mines Inspectorate and been concerned with the engineering aspects of many recent regulations and the Mines and Quarries Act, 1954.

He has travelled in America and Europe to study mining engineering practice, and is the author of many technical papers to professional societies. A Fellow of the Association, he is also a member of the Institution of Mechanical Engineers, and the Institution of Mining Engineers. Mr. Crook was made CBE in 1958.

MINE RESCUE OFFICIALS' EXAMINATION

IN the Rescue Station Officials' examination of the Institution of Mining Engineers in May, passes in the written examination were gained by Mr. Edgar Bonser, Ashby-de-la-Zouch, Mr. Robert Donkin, Wakefield, Mr. Wilfred Robinson, and Mr. F. W. Robinson, both of Mansfield Woodhouse (Notts).

Mr. Donkin also gained a pass in the oral and practical examination, together with Mr. A. E. Sheffield, Ilkeston, and Mr. B. A. Webb, Crumlin (Mon).

Fuel Policy Wanted

NUM URGES GOVERMENT AID FOR COAL INDUSTRY

RENEWED demand for a national fuel policy, with arguments about the need for special assistance for the coal industry, are contained in the annual report of the executive of the National Union of Mineworkers. The report, which will be discussed at the union's annual conference in Llandudno next month, describes the Government's indifference to the industry's problems as "incomprehensible."

Other British industries, says the report, are protected. Agriculture is heavily subsidized, and virtually every industrial product is sheltered by tariffs. The union does not necessarily oppose this, but asks why the Government's policy of "free competition" should apply only to coal.

The rapid rate of contraction over the past three years, with a fall in demand of 33,000,000 tons, or 15 per cent., and a run-down of manpower of 120,000 had created serious social problems in isolated areas and places where unemployment was already high.

"Coal Prices Kept Down"

During nationalization the price of coal had been kept below market level, and losses on imported coal had been borne by the industry. The National Coal Board had been prevented from accumulating financial reserves which could have amounted to hundreds of millions of pounds. Compensation and interest payments had amounted to £260,000 since nationalization, compared with the board's accumulated deficit over 13 years of about £50,000,000.

"Above all else," the report says, "coal is still the country's main source of energy and its only major indigenous mineral resource. It is an industry of strategic importance."

Up to now the coal industry has been treated partly as a public service and partly as a business enterprise, it is stated. The Government must make up its mind which the industry is to be. If it is to be a public service then money should be put into it to make it fully efficient. If it is to be a business enterprise then it must be allowed to charge an economic price.

The report announces the executive's decision to expel from membership two local associations of winding enginemen who have rejected proposals to merge with areas of the union. They are the Yorkshire Winding Enginemen's Association and the Derby and Nottinghamshire Winding Enginemen's Association. The necessary resolutions will come before the Llandudno conference. The report also says that the union intends to streamline its internal organization.

The Yorkshire association was willing to merge with the Yorkshire Area of the NUM provided it could maintain its separate identity within the Area and have right of representation on the NUM executive. Having had its terms rejected the NUM executive states that it has no alternative but to call for the expulsion of the associations.

Mr. W. C. Jackson, secretary of the two-county association stated that his members were unanimously against the proposed merger. It would mean that the organization which had been in existence since 1921 would be wound up and the members absorbed in the Area NUM.

Coal Can Do the Job

SPEAKING at the annual conference at Scarborough yesterday (Thursday) of the Rural District Councils' Association, Mr. B. J. Follett, senior technical representatives of the Yorkshire Sales Region of the North-Eastern Divisional Coal Board emphasized that the board was in favour of cleaner air.

It was doing its part to help, he said, not only as the greatest producer of solid smokeless fuel, but by giving a free technical advisory service to any consumer, large or small. Greater supplies of existing processed fuels were to be made available and work was going on to provide better domestic fuel in the shape of premium fuels. Even with current supplies, provided the correct equipment was used, there should be no difficulty in meeting the requirements of the Clean Air Act.

The prevention of smoke on larger plants was a relatively straightforward matter and the difference in treatment according to size range came from technical considerations and not necessarily from the capital cost of equipment. For installations smaller than those requiring 100,000 B.T.U. per hour, the answer had not at present been found in mechanical coal-firing. The most economical solution was in the use of solid smokeless fuel.

Mr. Follett maintained that solid fuels, whether bituminous, naturally smokeless, or manufactured smokeless, could meet the demands of the Clean Air Act in industrial and domestic applications and give satisfaction in all respects if properly applied. It was essential, however, that fuel and appliance be suited to each other, particularly in the case of larger stokers for bituminous coal.

Continued Recovery for US Steel Predicted

INCREASE in orders in August is expected in the US steel industry and this should mean that the industry's operating rate will not drop more than five points below the current level—estimated at 62.3 per cent. of capacity last week—states the chairman of the US Steel Corporation, Mr. Roger Blough. He indicated that the recovery in August would result from the end of inventory cutting by customers.

The consumption of steel, Mr. Blough added, would now support production at 70 to 75 per cent. of steel-making capacity.

THE RUSSIAN Communist Party, it is understood, has issued a directive to all iron consumers calling for all possible economy in its use. Competitions for the most sparing consumption in this field are being organized on a national basis.

Defects of Miners' Knee Pads

AT least one type of knee pad commonly in use by miners is ineffective in the prevention of beat knee, says Dr. J. S. McLintock, assistant chief medical officer to the National Coal Board, in an article in the current issue of The Medical Press.

Writing on miners' health hazards, he says that some 7,000 to 8,000 spells of absence due to beat knee are reported to the Ministry of Pensions and National Insurance each year. With the slow decrease this century in the average working height of coal faces, miners exerted considerable pressure on relatively small areas of the knees. Knee pads of one type or another had long been used by kneeling miners, but only recently had any research been carried out to determine the best type of pad. Statistical results of this research were not yet available, but the clinical impression was that at least one type of knee pad used was quite ineffective in the prevention of beat knee.

General health of coal miners was not markedly worse than average, but the physical demands of the job were such that minor illnesses necessitated absences which would probably not occur in less arduous occupations.

Referring to the causes of industrial dermatitis, which presented a "particularly difficult problem," he says that since the introduction of pithead baths, miners have tended to leave their pit clothes in the baths for fairly lengthy periods. In consequence these clothes tended to become dust-impregnated and were probably an important cause of frictional damage to the skin.

Rowland Barker's New Clients

FIRM of engineers' agents, Rowland Barker & Son, Limited, Sheffield, has been appointed to represent a number of companies throughout the country as from July 1. Rees (Mechanical Equipment), Limited, Cardiff, has arranged for Rowland Barker to represent them in steelworks in the northern half of the country. The company is also to represent British Wedge Wire Company, Limited, Warrington (Lancs), and its subsidiary, Modern Mechanisation, Limited, Kenneth Thelwall, Limited, Doncaster, Sheepbridge Equipment, Limited, Chesterfield, R. E. Barker & Company, Limited, Knottingley (Yorks), and Morrison Steel Erectors, Limited, in the territories covered by the various Divisional Coal Boards and in the iron ore mines.

For the past 30 years Mr. Barker has represented the Mining Engineering Company, Limited, Worcester, in South Wales, Lancashire, and Yorkshire. During that time he was responsible for installing the first face belt conveyor in South Wales, the first pneumatic stower in Lancashire, and the extensive underground system of 48-in. belt conveyors in the iron ore mines of North Lincolnshire.

TOTAL OUTPUT so far this year of the West Midlands Divisional Coal Board, at 6,322,000 tons, is 522,000 tons, or 9.3 per cent. less than in last year. In the four weeks ended May 28, the total output was 1,194,000 tons, 9.7 per cent. down on last year. Output per manshift at the coalface and overall is the highest ever recorded in the division over a five-month period. Compared with last year o.m.s. has increased by 5.5 per cent. to 90.37 cwt. at the face and by 4.2 per cent. to 28.49 cwt. overall.

Commercial Policy for Coal Needed

"NEGLECT of the gas industry by the coal industry can only be to the detriment of the coal industry and the nation," said Mr. Duncan D. Melvin, president of the Institution of Gas Engineers, during the opening session of its annual conference in Edinburgh recently. "The immediate need," he continued, "is for a well-balanced commercial policy for coal that will ensure the well-being of both secondary refined fuel industries—such as gas and electricity—and this requires reversal of the price trends of the past two decades."

"The relative use made of raw material will depend on its cost and the consumer, given freedom of choice, turns to that form of energy that will meet his requirements effectively at the lowest cost." To guide the consumer towards the fuel best suited to his purpose, Mr. Melvin declared, a revised coal price structure could be designed. Coal production must be concentrated in modern pits and the total product sold at reasonable cost.

He stressed the "doubtful wisdom" of allowing circumstances to develop that could only lead to more reliance by the gas industry—and industry generally—on imported raw materials while the country's coal resources were neglected.

The coal marketing policy should ensure the best use being made of each ton; the nuclear programme should accord with technical advance; and imported oil and gases should be complementary to energy requirements derived from native resources. "The gas industry, in such a scheme, would consist of a number of relatively large producing stations in the coalfields, together with some at ports, based on the use of oil, all linked by a national grid. This is exemplified," Mr. Melvin said, "by the Lurgi project at Westfield (Fife), a project made possible by co-operation between the coal and gas industries."

Changing Face of "Coaly Tyne"

DESPITE the fact that shipments of coal and coke from the Tyne during the first five months of the year were 18,000 tons higher than last year, the chairman of the Tyne Improvement Commission, Mr. Arthur G. Everett, told the annual meeting that it had to be realized that the face of the "coaly Tyne" was changing. Coal shipping points not needed for regular use were being closed, he said, and shipments were being concentrated on fewer staithes. On the other hand facilities for oil and petroleum were being extensively expanded.

During the first five months of the year coastwise shipments fell by 45,000 tons and foreign trade had increased by 63,000 tons. Mr. Everett referred to the improvement of facilities at Albert Edward Dock, the extension to Newcastle quayside, the probable start this year on the £12,000,000 road tunnel, and the provision of larger dry docks and berths for shipbuilding.

He was re-elected chairman of the commission with Mr. C. B. Carrick, deputy chairman.

NEW $15,000,000 titanium oxide pigment plant to be built at Tracy, Quebec, by British Titan Products (Canada), Limited, is expected to be completed by the summer of 1962.

BISRA Steelmaking Conference

ALL-BASIC OPEN-HEARTH FURNACES

A report, exclusive to IRON AND COAL, *of the remaining papers of the session on "Roof Construction" at the recent 54th BISRA Steelmaking Conference appears below. Test-rig trials of various methods of roof construction and experience in America and Holland with partially and fully suspended roofs are described.*

EXPERIENCE WITH THE ALL-BASIC ROOF TEST RIG OF THE UNITED STEEL COMPANIES, LIMITED

By J. R. LAKIN and C. S. WEST

DURING the post-war years interest in the "all-basic" furnace revived and the All-Basic Furnace Sub-committee encouraged the construction of and analyzed the data obtained from a number of furnaces[1]. The plants co-operating in the first trial programme used three main roof construction methods on furnaces of varying size, using different steelmaking practices. At Steel, Peech & Tozer and Stewarts and Lloyds, Limited, the "Continental" system was employed; the Consett Iron Company, Limited, and the Royal Netherlands Blast Furnaces & Steelworks, Limited, used the fully suspended "Detrick" system, and Richard Thomas & Baldwins, Limited, Redbourn, used a spring-loaded restrained arch construction.

The differences in construction, size, and practice made it difficult to draw any firm conclusions regarding the influence of design and refractory properties on furnace performance. However, the committee[2] concluded that design and operation were dominant factors and that good volume stability at 1,700 deg. C. and good high temperature strength were desirable qualities in the roof refractories. The failure of roofs by "slabbing" was taken to infer that increasing the thermal shock resistance of the bricks, and improving the roof construction and furnace operation to delay slabbing or retain cracked ends in position would result in improved lives.

A survey of all these factors in a single furnace under known conditions would have proved a lengthy and expensive procedure. However, the need to assess the importance of the many variables resulted in the idea of a test unit which would reproduce as many operating conditions as possible. The final design is illustrated in Fig. 1.

Test roofs of 19 ft. span and 4 ft. 3 in. wide can be erected above a rectangular furnace chamber. Heating is by four oil-fired combustion units. The two burners in the flue side-wall are of low capacity and are used for the early stages of warming up; above 800 deg. C. the burners in the opposite wall are used. Oxygen enrichment is used above 1,500 deg. C. and the maximum oil consumption is about 75 gal./hr. A trial programme was agreed in which the effects of (*a*) a maintained temperature of 1,700 deg. C., (*b*) temperature fluctuations between 1,700 deg. C. and 1,100 deg. C., and (*c*) application of iron oxide to the refractories, on roofs built according to accepted designs would be studied.

The "Continental" design was selected for the first trials and was to be applied by the methods used at Steel, Peech & Tozer and at Bilston. At a later stage the design adopted by Appleby-Frodingham was included and variations in rise and the method for allowing expansion were examined. More recently a fully automatic system using caliper arms has been tested.

Each test involved the determination of roof movements and the loads set up within the roof during the appropriate heating and operating schedule and an assessment of the extent of cracking in the bricks. Loads were measured by pairs of pressure capsules mounted between water-cooled blocks, each assembly having the same external dimensions as a roof brick. Fig. 2 illustrates the assembly; the capsules are located one-quarter of the way from the outside and inside surfaces. Normally loads were measured at three positions; at the centre and one-sixth of the way from each skewback. Cracking of the roof bricks was assessed visually by assigning a numerical value to the severity of cracking and averaging the indices for each third of the roof. All the trials reported used bricks from a single batch so that variations in brick quality were eliminated.

Results of Trials

(1) *"Continental" System—Steel, Peech & Tozer Technique.*—The "Continental" design uses pairs of transverse courses of rib bricks alternatively with three or four courses of intermediate bricks. The ribs are wired to transverse, curved, steel members and the back skewback channel is supported on springs. The technique originally used at Steel, Peech & Tozer was to tighten the springs sufficiently to lift the roof from the centres and maintain this initial tension throughout the heating-up operation by slackening the retaining nuts as expansion compressed the springs. Expansion allowances of about 0.8 per cent. were made longitudinally. Fig. 3 illustrates this type of roof applied to the test rig. The construction is identical with that used on the furnaces and expansion allow-

* Of the Swinden Laboratories of the United Steel Companies, Limited, Rotherham.

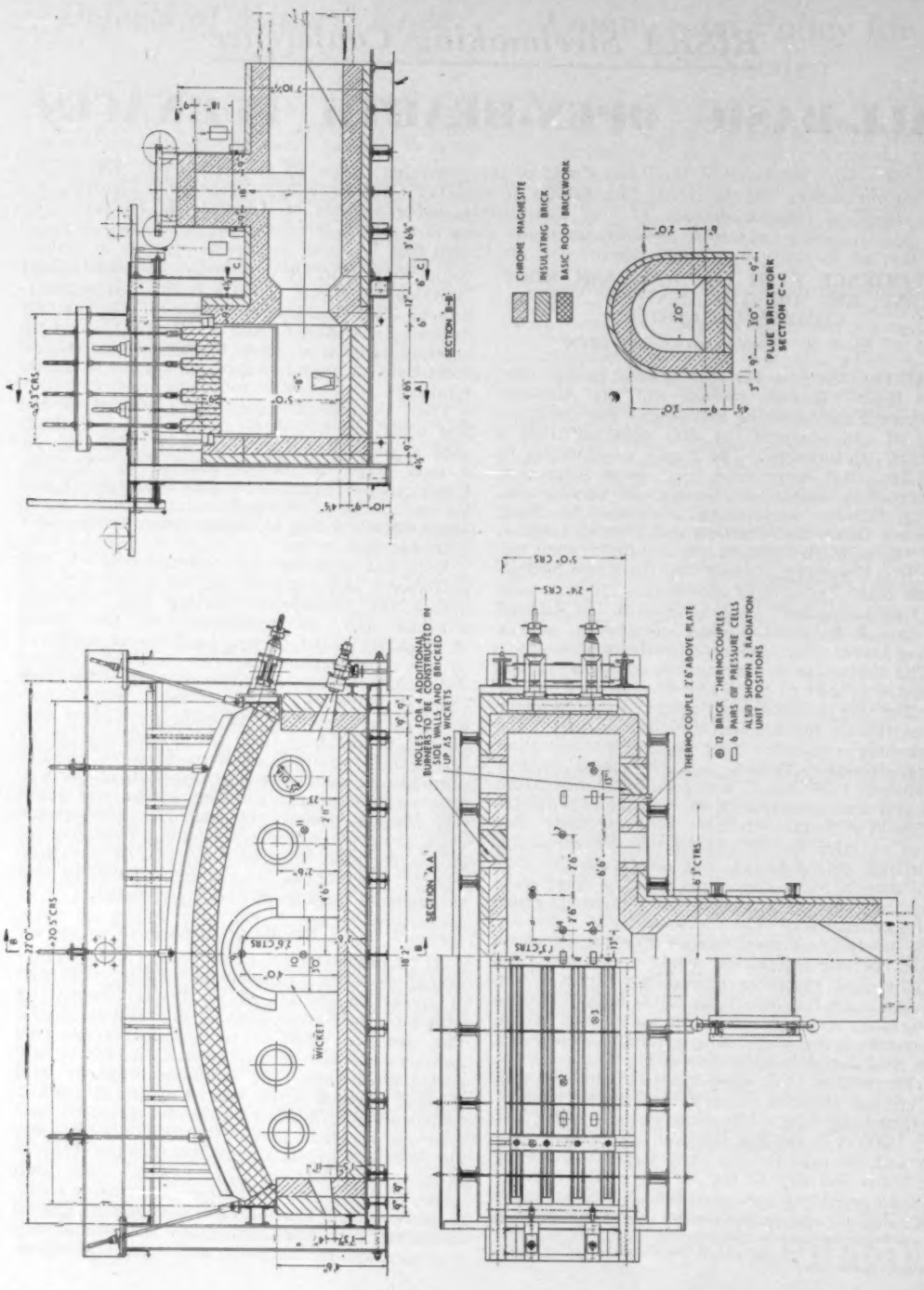


FIG. 1.—GENERAL ARRANGEMENT OF ALL-BASIC TEST-RIG FURNACE.

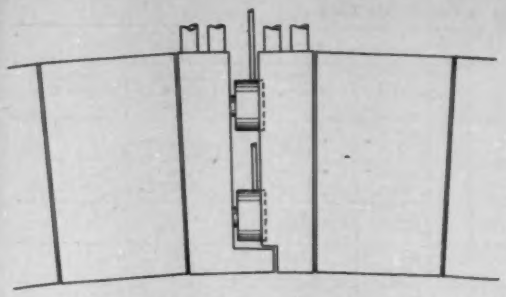


FIG. 2.—ARRANGEMENT OF WATER-COOLED BLOCKS AND PRESSURE CAPSULES.

ances were left between the roof and the side walls.

Four trials were made, as follow; all trials used a heating rate of 40 deg. C./hr. to the test temperature:—

(1) Temperature maintained at 1,700 deg. C. for 24 hr.

(2) Temperature raised to 1,700 deg. C. and thereafter cycled between 1,700 deg. C., 1,100 deg. C., 1,700 deg. C., 12 times. Each cycle lasted 2 hr. and closely corresponded with the temperature fluctuations between casts encountered with the Templeborough furnaces.

(3) Temperature maintained at 1,700 deg. C. for 24 hr. Iron powder injected on to the roof in three applications at a total concentration of Fe_3O_4, excluding losses, of 15 g./sq. in. of affected brick.

(4) Twelve temperature cycles between 1,700 deg. C., 1,100 deg. C., 1,700 deg. C. Iron applied to yield a concentration of 18 g Fe_3O_4/sq. in. This higher concentration was adopted for all subsequent tests involving iron powder applications.

The pressure cell results for the first trial were not considered valid as rigid water-cooling connections were made to the protective boxes. The results during the heating period for the other three tests were somewhat variable, but followed the same general pattern. Table 1 summarizes the

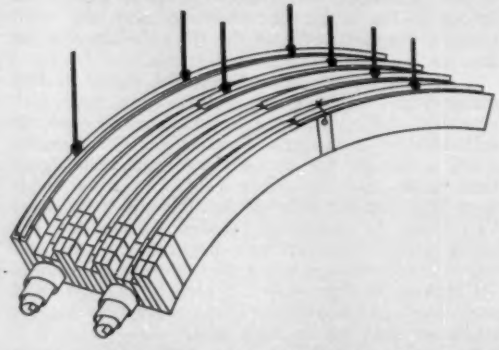


FIG. 3.—TEST-RIG PANEL OF "CONTINENTAL" DESIGN OF BASIC ROOF.

results for these and the later trials. All the "Steel, Peech & Tozer" roofs had an initial higher loading on the outer, "cold" side and during heating the higher loading transferred to the inner, "hot," side. The total load increased by about 50 per cent. Spring adjustments were required in each case and the total movement of the skewback channel was between ¼ in. and 1 in. During temperature cycles the indicated loads followed the temperature changes. Although some variation in the level of loads is apparent, the distributions are consistent with the expected behaviour of the roof.

No cracking of the bricks occurred in the tests at maintained temperatures and no other trials have been made in this manner. Cracking occurred in the two cycling temperature tests and average levels were 2.2. and 1.8 with and without iron oxide application. The values of the cracking indices arise from the statistical method used to obtain numerical values. As a guide to their sig-

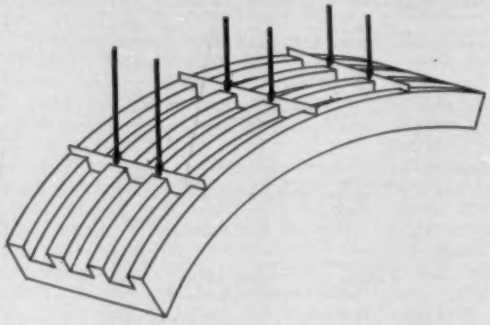


FIG. 4.—TEST-RIG PANEL OF APPLEBY-FRODINGHAM DESIGN OF BASIC ROOF.

nificance it can be taken that a value of 1 represents little or no cracking and a value of 3 is obtained when the majority of bricks are cracked severely; differences of 0.2 are significant. Thus, in this case iron oxide applications have significantly increased the degree of cracking of the bricks.

(2) *"Continental" System. "Bilston" Technique.*—The long lives obtained at Stewarts and Lloyds, Bilston, aroused considerable interest and it was decided to compare the "Bilston" technique with that used at Templeborough. The main difference is in the tightness of the construction. At Bilston the roof has no longitudinal expansion allowance and is jacked tightly during installation; the supports for the rib blocks are held down by rigid longitudinal members. During heating the springs are allowed to compress and are only adjusted in the event of serious unbalance. For the test-rig trials extra supports for the T-beams were added and were locked in place. No expansion allowance was left between the roof and sidewalls and the steelwork was strengthened along the sides at the level of the roof.

Two trials were made involving cycling tem-

FIG. 1.—GENERAL ARRANGEMENT OF ALL-BASIC TEST-RIG FURNACE.

TABLE 1.—*Test-rig Results on Open-hearth Roofs.*

Trial.	Type of roof.	Position of cells.	Average load (lb.)				Average cracking index.
			Cold.	1,700 deg. C.	During cycling.	Variation during cycling.	
2	8PT (Cycling no iron)	Upper	1,070	419	536	130	1.7
		Lower	242	1,714	1,266	1,002	
		Total	1,313 (1.0)	2,133 (1.62)	1,802 (1.37)	1,132 (0.87)	
4	8PT (Cycling with iron)	Upper	1,098	78	217	16	2.2
		Lower	64	1,790	1,335	527	
		Total	1,162 (1.0)	1,868 (1.61)	1,552 (1.35)	543 (0.55)	
5	Appleby-Frodingham (Cycling no iron)	Upper	1,200	960	904	340	2.2
		Lower	1,225	2,040	1,734	590	
		Total	2,425 (1.0)	3,000 (1.24)	2,638 (1.09)	930 (0.38)	
6	Appleby-Frodingham (Cycling with iron)	Upper	715	800	770	390	2.3
		Lower	420	1,112	690	520	
		Total	1,135 (1.0)	1,912 (1.68)	1,460 (1.29)	910 (0.80)	
9	Bilston (Cycling no iron)	Upper	—	—	—	—	1.0
		Lower	—	—	—	—	
		Total	—	—	—	—	
7	Bilston (Cycling with iron)	Upper	954	1,033	1,067	219	1.8
		Lower	934	1,846	1,301	981	
		Total	1,888 (1.0)	2,879 (1.52)	2,368 (1.25)	1,200 (0.64)	
11	Appleby-Frodingham (Crimped plates. Cycling no iron)	Upper	560	1,217	1,025	1,065	2.1
		Lower	547	1,043	908	870	
		Total	1,107 (1.0)	2,260 (2.04)	1,933 (1.75)	1,935 (1.75)	
12	Appleby-Frodingham (High rise, crimped plates. Cycling no iron)	Upper	105	1,355	616	1,047	1.9
		Lower	720	710	675	469	
		Total	825 (1.0)	2,065 (2.50)	1,291 (1.56)	1,516 (1.84)	

peratures one with iron oxide injection and one in a clean atmosphere. No pressure cell readings were obtained during the second of these tests. The results obtained for the first trial followed a similar pattern to those obtained with the "Steel, Peech & Tozer" roofs, although the initial readings were higher and showed only a small difference between the hot and cold sides. The increase in load was greater than with the "Steel, Peech & Tozer" roofs. This would be expected as the springs compressed by about 1 in., which corresponds with a change in load at the skewback from 12 to 20 tons, *i.e.*, from 1,200 to 2,000 lb. on an intermediate brick ring. Cracking indices were 1.0 and 1.8 for the runs without and with iron oxide. These compare with 1.8 and 2.2 for the comparable "Steel, Peech & Tozer" roofs and indicate much lower cracking levels.

(3) *Appleby-Frodingham Design.*—The basic roofs on the tilting furnaces at Appleby-Frodingham have all been built on fixed skewbacks; the early trials used a uniform roof thickness. Experience has shown that certain areas have worn consistently less than the average and enabled economies to be made by reducing the thickness in these places. No expansion allowances are made, the roofs being allowed to rise during heating until they are restrained by seven longitudinal channels clamped into place when the temperature attains 1,100 deg. C. By this means a tightly held roof is obtained without undue strains and no difficulties are encountered during tilting.

Fig. 4 illustrates a roof of this type applied to the test rig. To enable the same quality of bricks to be used the retaining members were made to fit the profile of the rib and intermediate courses.

Two tests were made using the same cycling temperature schedule as before, one test with iron and one without. The pressure cell readings followed the same general pattern as the previous trials, although the test without iron had higher total loads than any other test. The initial loads were high and it is believed that this and the general variability in individual values throughout the series arises from friction between courses and unavoidable differences in the tightness of keying.

Cracking indices were 2.2 and 2.3 without and with iron, respectively. These were the highest levels encountered in each case.

In comparing these three roof systems it is clear that in qualitative terms the changes in dis-

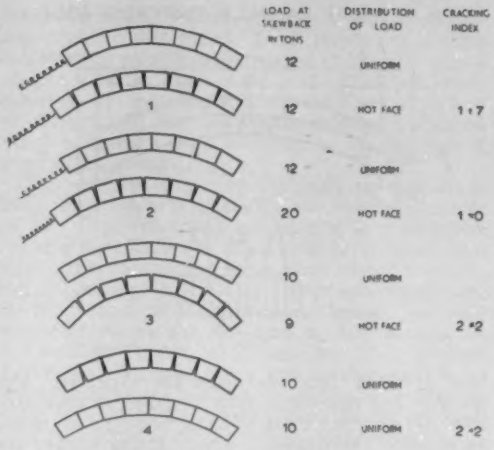


FIG. 5.—CHANGES IN DISTRIBUTION OF LOAD IN BASIC ROOFS DUE TO HEATING:— (1) STEEL, PEECH & TOZER "CONTINENTAL" DESIGN; (2) BILSTON "CONTINENTAL" DESIGN; (3) APPLEBY-FRODINGHAM NORMAL DESIGN; (4) APPLEBY-FRODINGHAM HOT-FACE EXPANSION ALLOWANCE DESIGN. (*Note*—THE TOP ONE OF EACH PAIR OF DIAGRAMS 1, 2, 3, AND 4 REPRESENTS THE COLD CONDITION AND THE LOWER ONE, THE HOT CONDITION.)

tribution of load during heating follow a pattern consistent with the theoretical behaviour. Fig. 5 gives a diagrammatic outline of this behaviour and it can be seen that the transfer of load to the "hot" face is as expected. It may also be expected that the total loads should increase during heating in the case of a "Bilston" roof and to a small extent in the "Appleby-Frodingham" roof, while "Steel, Peech & Tozer" roofs should maintain a constant load. The measured loads, however, show apreciable increases as the temperature is raised in all cases.

The loads transmitted within the roof in the "Continental" system will depend on the proportion of thrust contributed by the suspension members. The "Bilston" technique, in fact, aims to force the ribs into firm contact with the transverse irons and a similar tendency will exist in the "Steel, Peech & Tozer" roofs.

The cracking indices indicate a significant increase in the amount of cracking when iron oxide is admitted; the values are summarized in Table 2 in order of increasing severity.

TABLE 2.—*Effect of Iron Oxide in Furnace Roof Cracking.*

	No iron oxide.	With iron oxide.
"Bilston"	1.0	1.8
"Steel, Peech & Tozer"	1.8	2.2
"Appleby-Frodingham"	2.2	2.3

There is no clear relationship between cracking and the measured loads, but it may be significant that the order of increasing severity is the order of decreasing theoretical load. The theoretical loads are given in Fig. 5 and have been calculated on the assumption that the contribution of the suspending system is negligible. If the assumption does not hold, the order of the roofs is not changed.

This evidence that the most tightly held roof has the least tendency to cracking may have some bearing on the long lives achieved at Bilston, although the partial adoption of this technique at Steel, Peech & Tozer by not slackening the springs and omitting longitudinal expansion allowances had no apparent effect on roof performance. The experience to date with Appleby-Frodingham type roofs at Steel, Peech & Tozer also indicates that roof design has no significant effect on the rate of wear. These influences, however, are only valid for the Steel, Peech & Tozer furnaces. A later paper to this conference will show that the lives of roofs on the hot-metal tilting furnaces at Appleby-Frodingham are closely related to refractory quality.

Two additional trials have been made using the Appleby-Frodingham design. These were made to investigate the effect of two factors which are proving of interest at present. The first was an assessment of the use of expansion allowances at the hot face only. The roof was identical in construction with the previous trial roofs, but had eight prepared steel sheets in each ring. Each sheet, was crimped to a depth of ¼ in. for 3 in. at the "hot" end. The sheets had the effect of reducing the rise on heating and yielded a uniform distribution of load within the roof. There was no effect on the cracking severity, the index being identical with that of the "normal" Appleby-Frodingham roof.

The second additional test used the same technique, but was built to a higher rise—2¼ in./ft. of span, compared with 1.4 in./ft. for all other tests. Loads in the roof were lower than in any previous trial and the distribution showed higher loads on the cold side. The cracking index was rather lower than in the smaller rise roofs and this conflicts with the suggestion that cracking becomes more severe as the tightness is reduced.

Conclusions

The lessons learnt from the test rig may be summarized as follows. The changes in load distribution with rise in temperature can be predicted, but the levels of load seem to be largely determined during building; the suspending structure in "Continental" roofs may also influence roof pressures. Thermal cracking of the bricks was reduced as roof tightness increased.

Another important aspect of the work lies in the increased confidence with which investigations on a smaller scale may be planned and the data obtained applied to a full-span roof.

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(*Continued overleaf*)

ROOF CONSTRUCTION : AMERICAN EXPERIENCE

By W. S. DEBENHAM (*United States Steel Corporation*)

AT the present stage of experience with basic open-hearth roofs in America it is somewhat difficult to decide just how to approach a discussion of the effect of roof construction on roof life. Thus, considering such factors as expansion allowance, arch stresses, roof rise, roof height, suspension means, and skewback design, generally accepted as influencing roof life, it is, found that some of these items apparently are not factors at all.

It seems necessary to recognize not only that there may be considerable divergence of opinion as to the important factors influencing roof performance, but that this divergence stems from varied approaches to the truly fundamental problem in basic roof construction. The problem is how to build, with minimum initial investment, a basic roof which will provide a minimum rate of brick wear and assurance against collapse throughout the roof campaign.

Early Experience

The relative merits of sprung and suspended construction and the characteristics of available basic brick were exhaustively examined in the early '40s, and it was concluded that the most promising roof brick was inadequate in hot-load carrying ability for a sprung arch and that a suspended roof was the best from the standpoint of ease of patching, and considerable patching was thought to be necessary for achieving an economic roof life. Observations of the few American roofs at that time indicated that if the roof were to be arched, a radially suspended roof built like a sprung arch should be preferable to vertically hung brick which necessitated a corbelled construction that promoted spalling. Also it was recognized

AN AMERICAN RADIALLY SUSPENDED ARCH

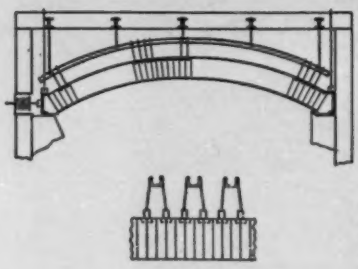


FIG. 1.

that provision must be made for expansion and growth, and that steps must be taken to minimize and equalize the brick-to-brick pressure as much as possible. Accordingly, a light spring loading on the rear skewback, plus considerable expansion allowance across the arch was provided. This type of construction, shown in Fig. 1, was used for the first all-basic furnace of the United States Steel Corporation at its South Works and, although many variations in design and bricks have been tried, the principal features of the original design are still in use on this furnace at the present time.

This furnace would not have been kept all-basic throughout this 12-year period unless the company was convinced that an economic advantage over silica roofs would be obtained eventually, as, of course, it was. However, considering that up to 1958, only six other companies had installed a mere total of 13 basic roofs, it is obvious that the inducement to such construction was not overwhelming.

Recent Experience

The outlook on all basic furnaces in the United States was altered drastically in 1958 because a

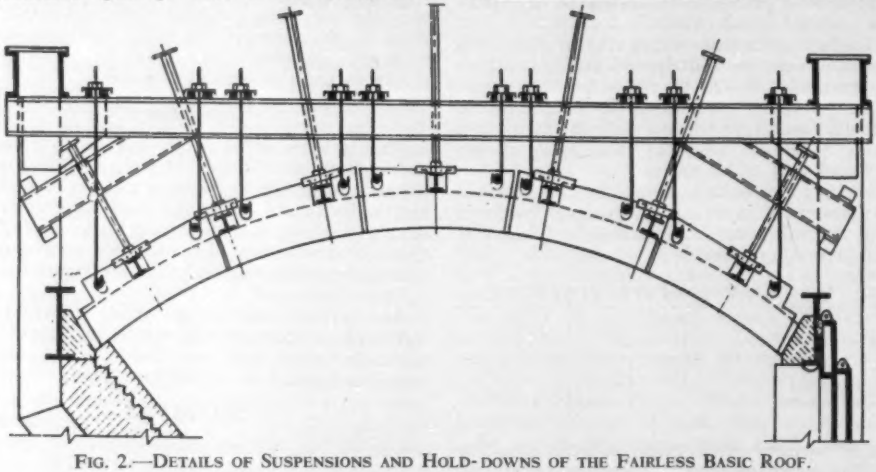


FIG. 2.—DETAILS OF SUSPENSIONS AND HOLD-DOWNS OF THE FAIRLESS BASIC ROOF.

better solution to the threefold basic-roof construction problem was found. Until then, roof designs had satisfied only the requirement of keeping a roof on the furnace until worn out. This had been achieved by the simple, but expensive, expedient of hanging all the brick individually, a method which militated against economy in construction or wear of the brick.

This matter of getting the most mileage from basic roof brick is probably the most important of all. Experience has taught that a prerequisite for this is to keep the brick arch in position, thus minimizing local stress areas contributing to cracking and peeling. And the key to this accomplishment is the longitudinal hold-down beams, as ably demonstrated by the Russians, by Mr. A. Jackson at Appleby-Frodingham, and by Mr. Howard Parker at Fairless. From this fundamental basis in construction, a number of other design features may enter into the determination of the ultimate roof performance and economy. Without the longitudinal hold-down construction, it is also possible to employ various means to improve roof life, but it does not seem likely that any other measures can achieve the roof life or the cost advantages now obtainable with the hold-down principle. Our experience at South Works is a case in point.

From the start it had been observed that a good portion of our suspension system was not suspending, but that many of the hangers would be raised, often a matter of inches, off their supports, particularly a few feet from each skewback. It was felt that some suspension was desirable and so the problem was to determine how much could be dispensed with and where. For a while the obvious cure of attempting to hold the roof down was tried by simply dropping the alternate radial suspension channels down on to the roof and wedging them there, still using the complete suspension system. This was abandoned in favour of ever-increasing expansion allowance and decreasing rear spring pressure, with the result that the last two roof campaigns have shown no sign of bulging and, partly due to the use of internally plated bricks, have achieved record unit roof lives for this furnace of 358 and 330 heats, as against an average of 263 heats for all the preceding campaigns. However, in the same shop, the first three campaigns with the rigidly held Fairless-type roof averaged 383 heats, using a thinner roof and with a considerably lower installation cost.

Up to March this year, there were about 257

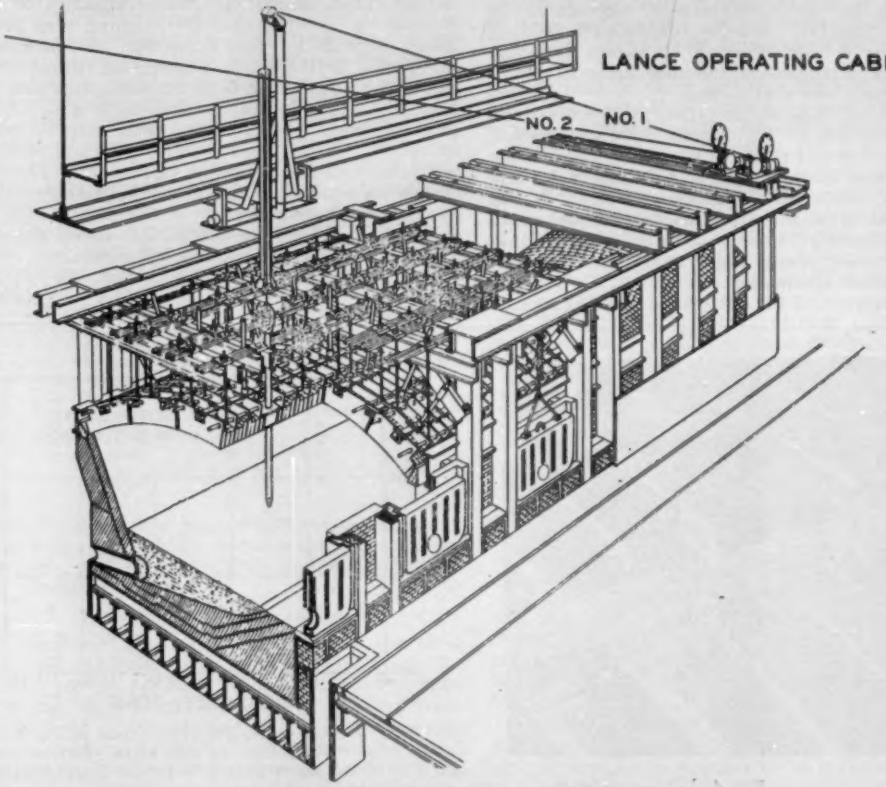


FIG. 3.—FAIRLESS BASIC ROOF WITH OXYGEN LANCE.

TABLE 1.—*Types of American Roof Brick.*

—	No in use.	Per cent.
1.—Restricted arch; fixed skew back; transverse plates	242	94.5
A. Ribbed (Fairless)	163	64
B. No ribs	26	10
C. Ribbed with tab brick suspension	11	4
D. No ribs with tab brick suspension	42	16.5
2.—Unrestricted; fully suspended	14	5.5
A. Flat	13	5
B. Arched	1	0.4

operating all-basic furnaces in the United States and Canada, about half of which were in the United States Steel Corporation. This represents a conversion to basic roofs of about 28 per cent. for the total steel industry and about 50 per cent. for United States Steel Corporation. These furnaces may be classified as shown in Table 1.

Figs. 2 and 3 show the construction of the Fairless roof. A modification of the original means of supporting the transverse plates consists of the tying together of the plates and hold down beams instead of using plate-supporting rods (Fig. 4). In the ribless roof (Table 1), Type 1B, the construction is the same with the hold-down beams down on the brick. Fig. 5 shows the two methods of employing tab brick suspension represented by Types 1C and 1D. The flat suspended basic roof is receiving a little attention: it uses a vertically hung brick arrangement, the roof being flat from front to back and end to end.

Apart from these major types, there are at least two installations of engineering company designs, one quite novel, involving suspended brick from spring-loaded beams hinged at the skewbacks, and one fairly similar to the Fairless design. Within these listed types there are also numerous minor variations, most of which involve different spacings of the transverse plates, and in at least one instance, their complete elimination.

Those variants of the restricted arch design which employ both the transverse plates and the sus-

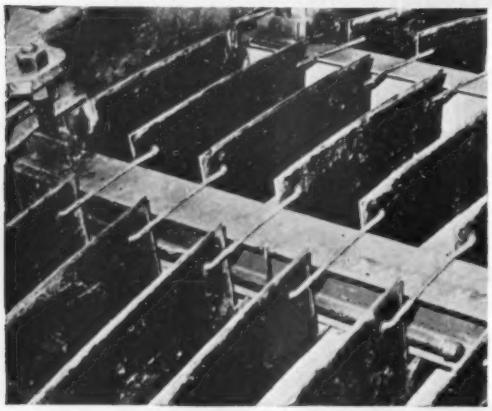


FIG. 4.

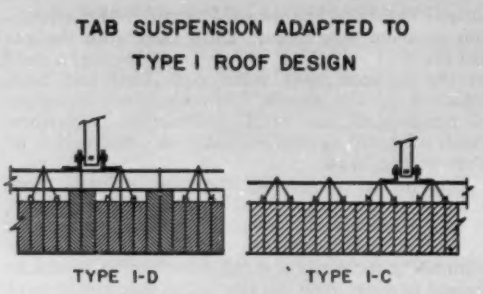


FIG. 5.

pended tab brick were introduced in 1958 in United States Steel Corporation shops to provide just enough roof life to overcome local silica roof problems by employing a thin basic roof of 9 in. thickness without ribs at a cost comparable to heavy 18-in. and 22-in. ribbed silica roofs. At that time there were some doubts concerning the stability of the thin roof without ribs, and the tab brick system was used. Since then the design has persisted in some quarters with both 9-in. and heavier 12-in. and 15-in. roofs, primarily on the grounds of greater ease in patching and fewer losses of patches. This advantage, of course, can be applied to the Fairless roof also, through the use of tab brick instead of conventional brick for patching, and this practice has been adopted by several plants. Accordingly, there may be some uncertainty as to the future of the tab roof of restricted arch design and of various other features of this construction. However, the primary objective was to standardize on a workable design as rapidly as possible and seek further economies and refinements later as dictated by experience.

In United States Steel Corporation, all but the original all-basic furnace are of the longitudinal hold-down type. Of approximately 100 campaigns

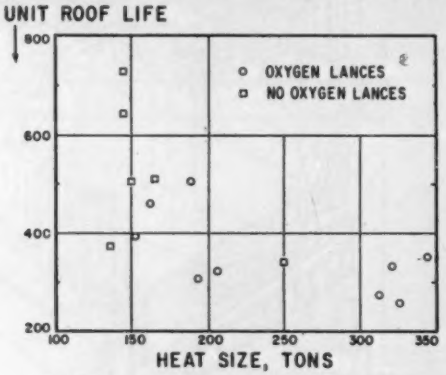


FIG. 6.—RELATION BETWEEN BASIC ROOF LIFE AND HEAT SIZE IN AMERICAN OPEN-HEARTH PRACTICE WITH AND WITHOUT OXYGEN LANCING.

FRONT SKEW SECTION OF THE BASIC FURNACE

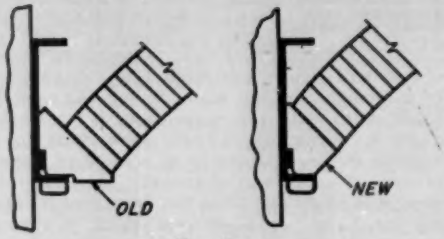


FIG. 7.

now completed, unit roof life available on 81 campaigns has averaged 370 heats. This is 3.6 times the 1958 average unit roof life for silica roofs. However, the average ratio of basic to silica roof life in those shops using both silica and basic roofs in the year 1959 was 4.4. This reflects the improved know-how on basic roofs and the decreasing ability of silica roofs to cope with present operating conditions. Fig. 6 shows the influence of heat size and oxygen practice on roof life.

Since calculated breakeven points range from a basic to silica ratio of 2.0 to 3.0, depending on the furnace design and type of roof, the company's interest in a rapid conversion to basic roofs is understandable. On the basis of current performance, basic furnace operation will result in an increase of approximately 2 lb. of basic brick and a decrease of 7 lb. of silica brick per ton of steel, with a slight increase in fireclay brick consumption. However, the increase in basic roof brick may be partially offset by increased life of backwalls, frontwalls, and port ends, as shown by the trend in refractories consumption at Fairless Works (Table 2).

TABLE 2.—*Effect of Basic Roofs on Brick Consumption at Fairless Works.*
(lb. of brick per ton of steel.)

	1956.	1957.	1958.	1959.
Construction:	Silica.	Silica.	Partial basic.	All basic.
Silica brick..	12.41	9.30	8.26	4.94
Clay brick ..	3.71	3.09	3.07	4.36
Basic brick..	10.88	14.16	8.61	7.91
	27.00	26.55	19.94	17.21

The foregoing is a general picture; the influence of how specific design features and construction practices on roof performance and behaviour are now considered.

Influence of Design Features

Roof Rise.—We have found that the rise of a restricted arch basic roof should be at least 2 in./ft., and higher if possible. For comparison, most American silica roofs have a rise varying from 1.5 in. to 2 in./ft. of span. With high-rise basic arches, some in excess of 2.5 in., it has been noted that the resultant reduced arch stress minimizes the cracking behind the hot face of the brick and prolongs roof life. In some plants where the rise has been kept the same as silica roofs, either through a desire to use the same arch forms, or inability to change, roof life has generally been poorer than in comparable high-rise furnaces.

With fully suspended arches employing spring loaded skewbanks, rise, of course, is not critical, and thus a rise of 1.1 in. or less has long been employed on the South Works original all-basic furnace.

Roof Height.—Increased roof height has proved equally as effective in improving basic roof life as it was with silica. Table 3 shows the improvement in roof life which was obtained after the skew height and roof rise were each increased 6 in. on a 320-ton furnace, as compared with the eight previous basic campaigns in the same shop.

TABLE 3.—*Influence of Raised Roofs on Basic Roof Life.*

—	Total heats.	Heats to 1st patch.	Unit roof life.	Basic brick, lb./ton.	Tap to tap time.
Eight basic roofs ..	343	201	293	4.14	9:08
Raised roof face ..	503	344	457	2.60	8:31

It is possible to get a roof too high for efficient operation, but there is little danger of this, particularly with oxygen lance practice, due to space limitations above most furnaces. One advantage of the flat suspended roofs which has contributed considerably to their performance and continued use is the ability to get maximum roof height with minimum changes to the furnace structure.

Expansion Allowance.—It is the usual practice in most American restricted arch furnaces to provide from 0.5 to 1.0 per cent. lateral expansion allowance through the use of asbestos tape tabs, $\frac{1}{16}$ in. × 2 in. × 3 in., in the hot face joints every fourth brick or so by $\frac{3}{32}$-in. dimples pressed into the steel jackets on the brick, the object being to compensate for the expansion occurring prior to the start of plastic flow in the hot ends of the brick. However, there is no conclusive evidence that this practice is necessary since several roofs have been installed without any expansion allowance and have performed with no apparent ill effects. That this is also done in the United Kingdom, and with burned, rather than chemically bonded bricks is encouraging. In contrast to the provision for transverse expansion no longitudinal expansion is provided, and in some shops the roof rings are deliberately jacked to assure both tightness and straightness.

It is important that the roof be pinned down cold so that it cannot rise on heating-up. In this way the exact original contour of the arch is assured, and the roof does not "work" with temperature changes as has been observed when the hold-downs are not tightened until the roof is heated.

Transverse Plates.—The use of $\frac{3}{16}$-in. steel plates from skew to skew between brick rings on centres of 9 in. or greater appears to be a feature unique to the Fairless roof. The plates function as simple

suspension means through welding to the steel plated brick, assist in maintaining roof contour between hold down beams, and provide a convenient means for supporting wire-hung tab bricks when these are used. The spacing of the plates and even the plates themselves are somewhat controversial, and there is a growing tendency to experiment cautiously with wider spacings by eliminating the plate in the valley courses where they are most likely to be burned off when the roof is thin, particularly if dirt is allowed to accumulate on the roof.

Very recently, however, experience at United States Steel Corporation has indicated that the transverse plates play an important part in the performance of roof design. In two identical adjacent furnaces, the same roof bricks were used to instal 9-in. roofs with 12-in. ribs. In one furnace the transverse plates were installed only in the rib courses, and six valley courses were used instead of the usual four so that the plates were on 24-in. centres. In the other furnace, transverse plates were eliminated. The latter roof sagged and had to be removed at 230 heats; the roof with the plates was still on at 297 heats.

Brick Size.—The predominant brick sizes are 4½-in. × 3-in. keys having two internal plates, and 3-in. × 3-in. keys with no internal plates, as it is firmly believed that the bricks of smaller cross-section minimize spalling. The 3-in. × 3-in. keys offer some cost advantage and from limited results to date appear equally satisfactory from the standpoint of installation cost and performance. In a trial of Russian type burned brick at Fairless Works it was believed that the 6-in. × 3-in. cross-section of the bricks contributed to their poor showing of less than 300 heats in both the Russian type and the Fairless type roofs.

Skewback Brick.—In the early basic roofs, a serious scalloping occurred along the front of the furnace, particularly above each door opening, as a result of the use of an improper skewback brick design. A new skewback design that shifted the arch thrust from the skewback toe to the channel greatly improved this situation. The old and new skewback shapes are shown in Fig. 7.

Ribbed v. *Plain Roofs.*—While the 12-in. and 15-in. ribbed Fairless-type roof is the most popular single type, a number of plain roofs, with or without suspended brick, are being successfully operated. Proponents of ribbed construction claim greater roof stability and, because the ribs lift the hold-down beams, the roof is easier to clean and the beams are less subject to damage by heat. The installed cost of a plain roof with tab bricks is comparable to that of a ribbed roof with regular brick. From limited comparisons available, performance is also comparable, or slightly in favour of the ribbed roof. The most economical is probably the plain roof with no brick suspension but no comparative data is available as yet.

Roof Thickness.—Some exceptionally long runs have been obtained with 9-in. roofs in 165-ton furnaces with no oxygen lances, but these are now giving way to 12-in. or 12-in. and 15-in. roofs to obtain still longer campaign life. A comparison of campaign and unit roof life for 9-in. and 12-in. roofs, both with tab suspension, is as shown in Table 4. Assuming all roofs came off at the same average thickness, the rate of erosion of these two groups of roofs was practically identical. However, it is likely that little can be gained by exceeding the 12-in., or 12-in. and 15-in. thickness, as two trials with 15-in. and 18-in. roofs failed to improve roof life.

TABLE 4.—*Effect of Roof Thickness on Basic Roof Life.*

—	9-in. tab roofs.	12-in. tab roofs.
No. of campaigns	5	4
Average total heats ..	310	532
Average unit roof life ..	356	523

Summary

The most important single factor in basic roof design is the control of roof contour through longitudinal hold-down beams and this, coupled with a simple suspension system into an economical construction, meant that rapid conversion to basic roofs was not only assured but became mandatory in a period of increasingly severe operating conditions.

As 94 per cent. of all American basic roofs now embody these fundamental design principles, comparisons of the far less important design variations become difficult unless scrupulously carried out under identical furnace conditions. But such tests are being and will continue to be made until the ultimate in basic roof efficiency is achieved.

ROOF CONSTRUCTION: RIGID *v.* SPRUNG ROOFS AT THE TEMPLEBOROUGH MELTING SHOP

By H. H. ENGLAND (*Steel, Peech & Tozer*)

AN opportunity to compare the performance of sprung and rigid roof constructions came about at the Templeborough melting shop of Steel, Peech & Tozer during last year. All the early work on all-basic furnace construction at Templeborough was done with the "Continental" type of suspension. This is a rib and valley design with inverted "T" irons above the ribs, the tabs of the bricks being wired to the "T" irons individually. The valley bricks are shaped to form a wedge.

This design was standard at Templeborough until the development by the Appleby-Frodingham Steel Company of a rigid held down construction (the A-F design), the great success of which led to trials of a similar construction at Templeborough.

At the time there were two "Continental"-type "all-basic" furnaces in commission, and so by building an A-F design furnace and maintaining similar firing conditions and roof control temperatures, a direct comparison was possible. The results of the trial were as follow:—

"F" furnace "Continental" design 260 and "N" furnace "Continental" design 293: Average 277 heats.

"E" furnace A-F Rigid design: 277 heats.

The firing rate was 450 gal./hr. on all furnaces for this trial. The results of the trial show clearly that for the conditions of the Templeborough melting shop there is little to choose between the two designs from the point of view of roof life. However, from considerations of the repairs, costs, and furnace availability, the A-F design has certain very definite advantages.

Fundamentally, the A-F roof design is much simpler in conception and construction. The steelwork is erected much more rapidly and there is no individual tying to do on rib bricks, the roof being very like normal silica furnaces in appearance. It has the especial merit of not requiring the individual shaping of bricks for lagging. Altogether this type of roof showed about a 20 per cent. saving on time and materials.

Following this trial it was decided that all new basic roofs at Templeborough should be of the A-F design.

At present there are six all-basic furnaces, and it is planned to convert a further two by next August. The areas of the furnace roof that showed trouble on the earlier trials no longer do so and the walls and slag pockets are now the trouble spots. There is obviously much to be learnt still regarding the efficient and economical operation of "all-basics." At Templeborough the furnaces are in very cramped surroundings and it is not possible to build things ideally. For instance, the sizes of slag pockets and chequers are severely limited. Each set of conditions will be accompanied by a furnace weak spot and with our present all-basic design and practice the weak spot is definitely now "downstairs."

Even under these conditions it can be said with confidence that all-basic furnaces permit faster driving and more severe conditions of working than would be possible on the standard silica-roofed furnace.

ROOF CONSTRUCTION: EXPERIENCE OF DETRICK AND "CONTINENTAL" ROOFS AT IJMUIDEN

By P. W. L. LANZING (*Royal Netherlands Blast Furnaces & Steelworks, Limited.*)

General

THE increase in steel production at the Ijmuiden plant, obtained in 1951, was effected by increasing the size of the five existing furnaces to 185 tons, and by converting them to all-basic. This conversion was deemed necessary in order to maintain a high rate of availability. At the time of the initial decision, there was only little experience with all-basic furnaces available, apart from that of Germany and Austria, Russia being as yet closed-off. The choice of the fully suspended Detrick roof was, therefore, based on our own judgment rather than on operating experience in other plants.

Steel capacity being the bottleneck meant that annual output was more important than devices or operating practices, which would have resulted in reduction of costs at the price of less production. As long as the product of hourly rate and availability kept increasing, thereby enabling the mills to show greater profits, increases in fuel- and refractory-costs were tolerated. Higher outputs were obtained by increasing fuel input, faster charging, improved burner design, and the limited use of oxygen for decarburization.

The inevitable consequence was a steady decline in roof life, although not in availability, because the masonry-department kept abreast of building and repair developments. While being fully aware that roof construction was only one of several factors likely to influence roof life, it was decided in 1956 to try a different construction. The knowledge we have today of Russian developments, of the Fairless roof, and the Appleby-Frodingham design was not then available. The only other design proven in actual operation was the "Continental" partially suspended roof apart from the Bilston modified version of this which had done so well but which would have entailed rather costly reinforcements to the steel superstructure.

It was decided to try the "Continental" design, keeping well in mind its disadvantages in theory which were:— (*a*) Time-off for general repairs was expected to be longer than for Detrick; (*b*) weight of complete roof could be calculated to be 25 per cent. heavier (including filler-bricks) than a Detrick roof; (*c*) since not all bricks are suspended, the danger of collapse is not imaginary and also hot-patching seems to be more difficult than with a Detrick roof.

Execution of Trials

In order to achieve best results it was decided to use two types of bricks only, referred to here as "A" and "B" bricks. The manufacturers of these bricks were requested to specify the tapers to be used, expansion allowances, and spring loads, and to supervise the actual building of the roof. Only fired bricks were to be used, ribs being 20 in., non-suspended rings 12 in. long. Transversely sheets of wire-gauze were placed between bricks; longitudinally metal sheets were used. The expansion allowance was, transversely, one $\frac{1}{4}$-in. thick cardboard inserted after every 11 bricks, and longitudinally, one $\frac{1}{4}$-in. thick cardboard inserted after every four rings. The roof span was 22 ft. 6$\frac{1}{4}$ in., the rate of rise 1$\frac{11}{16}$ in. per ft. of span and distance between sill-level and crown, 8 ft. $\frac{7}{16}$ in.: these three dimensions were identical with the roofs of Detrick construction. It turned out, that the manufacturers of the "A" and of the "B" bricks held different opinions about desirable spring loads in the skewback-channels, and also about the method to be followed while heating-up. Thus one roof was built and heated up with uniform spring loads, having two loads of 7 tons on 8-ft. skewback sections, whereas in the next roof the springloads were adjusted according to the behaviour of the sections of the roof while heating-up and during the first 10 heats. In this case the load varied from 3 to 11 tons. The hold-

TABLE I.—*The Results of Five Campaigns with Detrick Roofs and Five "Continental"-type Roofs.*

Campaign number.	Roof life in heats.	Production, ingot tons.	Fuel consumption, million B.Th.U./ton.	Roof brick consumption, lb/ton of steel.		
				Main rep.	Hot repair plus filler bricks.	Total.
			Detrick construction.			
16	171	33.023	3.75	7.8		7.8
17	219	42.188	3.53	6.8		6.8
18	212	41.029	3.55	7.3		7.3
19	190	36.841	3.41	7.1	0.6	7.7
20	209	40.249	3.49	7.3		7.3
			"Continental" Construction.			
22/23	285 (174+111)	54.759	4.45	5.5	0.9	6.4
24	178	34.034	3.93	8.9	1.3	10.2
25	186	35.511	3.81	8.7	1.5	10.2
26	212	40.782	4.2	7.5	1.4	8.9
27	194	37.679	4.4	8.2	1.5	9.7

downs on the roof were, in the author's opinion, of relatively minor importance, because they only held the roof down locally and not continuously along its entire length.

In the trials an endeavour was made not to give the furnace any preferential treatment, therefore, fuel input, hot metal percentage, charging time, and amount of oxygen used for decarbonization were all kept within the normal pattern.

TABLE 2.—*Averages of Campaign Results.*

	Detrick.	"Continental."
Roof life in heats	200	211
Production hours	2,016	2,280
Steel production, ton/hr.	20.46	18.78
Main repairs: hours	163	251
Hot repair: hours	1.6	16
Main repair: manhours	573	1,334
Roof bricks, tons,		
Main repairs	126.468	137.805
Total roof brick	128.700	161.205
Lb. bricks per ton steel	7.4	8.85
Availability (per cent.)	92	88

Results

The trials were run between December, 1956, and June, 1958, during which period five full roof campaigns were finished. Among them were roofs of "A" and "B" bricks and one roof of "A" type, produced by a licensee of the manufacturers of the "A" bricks. The results were as shown in Tables 1 and 2.

The Results of Five Campaigns with Detrick Roofs and Five "Continental"-type Roofs.

In evaluating these results it should be borne in mind, that certain hidden factors may have played a role in determining roof life. The fact that all furnaces were driven hard, involved very high and fluctuating furnace pressures (over 0.2 in.), a factor which may have had a varying influence from campaign to campaign. The same possibility applies to other operating factors, such as fluctuation in roof temperature, amount of oxygen, variations in grade of steel produced. Also, it may well be, that adverse conditions in our furnaces, such as high specific fuel input and high furnace pressure masked the effect of some factors. Therefore, the conclusion drawn from these results, namely, that the Detrick construction is preferable, although justified for this melting shop should not be construed, without previous trials, to be valid for other shops.

Corrosion Scientists at London Exhibition

SOME of the country's leading corrosion scientists and engineers will take part in a meeting being held in connection with the Corrosion and Metal Finishing Exhibition in London, this autumn. The Corrosion Group of the Society of Chemical Industry will be holding the meeting on December 1 in the Empire Restaurant at Olympia at the invitation of the organizers of the exhibition. It is expected that the papers to be presented will deal with "The Influence of Water Movement on Corrosion."

The meeting of the Corrosion Group is typical of the strong support for the exhibition which is coming from leading industrial and official quarters. Two of the largest exhibits will be those of the Atomic Weapons Research Establishment and the Department of Scientific and Industrial Research. Plans are being made for the participation of other Government and professional bodies in the field of corrosion and metal finishing.

Up to the present over 80 firms have booked stands, making an exhibition area on the ground floor of the Empire Hall of over 20,000 sq. ft. Stands on the first floor are now being booked. The exhibition will open at 11 a.m. on November 29 and will remain open until December 2. Details may be obtained from the Exhibition Director, 9, Eden Street, London, N.W.1.

Forthcoming Events

JUNE 29—JULY 1

Institution of Mining Engineers: Summer meeting in Cardiff. "The Degradation of Coal in Power Loading," by G. V. Standerline and Dr. S. Islwyn Evans, and "Pulmonary Disability Among Coal Miners, with Special Reference to the Pneumoconiosis Field Research," by John M. Rogan.

JULY 25

Institute of Metals: Meeting at the Royal Institution, Albemarle Street, London, W.1, at 6.30 p.m. "The Structure of Metals and Intermetallic Compounds," by Prof. Linus Pauling, of the California Institute of Technology.

Basic reasons for the decline in the demand for coal during the past two years were outlined by Mr. Ronald W. Parker, chairman of the Scottish Divisional Coal Board, in an address to members of the Scottish Branch of the National Association of Colliery Managers on April 6, 1960, when he discussed the future of the mining industry in Scotland in the light of the NCB's "Revised Plan for Coal." Mr. Parker referred to the long-term effect of the new market conditions.

Future of Coal Mining in Scotland

Mr. R. W. Parker's Address to Colliery Managers

IT is now over 13 years since the mines in Scotland came under the management of the National Coal Board. They have been years of high hope, of some successes, and many disappointments; above all, they have been years of great endeavour with the primary objective of giving the country the coal it needed, often in doubt but never unfulfilled. In the last two of these years the country's needs and the assessment of its future needs for coal have changed very quickly and a new situation has now to be faced.

In the rush of day-to-day events, it is not always easy to see the long-term changes as they evolve and to feel reasonably assured that the strategy adopted is best suited to the need of the nation and of the industry in Scotland. The coal mining industry in Scotland is now in a phase of "strategic retreat," a period in which we must retreat from our earlier hopes and ambitions but do so in a way that is planned and that will bring the industry to a position that we can hold securely.

National Plans

There have been three strategic plans for the coal mining industry. The "Plan for Coal," published in 1950, set out the long-term future as it was seen in that year: "Investing in Coal," published in 1956, confirmed the earlier strategy with only minor modifications; but last year the "Revised Plan for Coal" accepted and reflected changes in the outlook for the future. Any plan for the coal industry must rest on forward estimates of the volume and the distribution of production and demand and the basis used in these three plans is set out with reference to 1965. To simplify presentation, where these plans referred to output and demand in terms of a range the mid point has been adopted.

The impact of change between the 1950 and the 1959 plans has been much greater in Scotland than in England and Wales. The primary reason lies in the differing incidence of the changes in demand. In England and Wales the home demand has dropped by 4 per cent.; in Scotland the home demand has dropped by 22 per cent. In the export and coastwise market both countries have reduced demand by about two thirds, but whereas in England that accounted for only 7½ per cent. of their total production, in Scotland it amounts to 15 per cent.

The basic reasons for the reduction in demand which are common to both countries are, of course, the expected growth of energy from nuclear sources and the expanding use of oil. A distinguishing factor affecting Scotland, however, is the difference in the growth of industrial activity in the two countries. Using the published indices of industrial production, with the year 1954 as base, the trends are shown in Table 1.

TABLE 1.—*Indices of Industrial Production.*

Year.	UK.	Scotland.
1954	100	100
1955	105	102
1956	106	104
1957	107	104
1958	106	101
1959*	111	102

* First six months only.

Demand must be reflected in output and, so

far as England and Wales are concerned, the reduction in planned output rests solely on reduced demand, but in Scotland a second factor has to be taken into account—available capacity. It was well known at vesting day that the capacity of the Scottish coalfields was declining fast and to meet that situation the board put in hand two programmes of reconstruction, a short-term one of small surface drifts and a long-term one of new sinkings and major reconstructions to reach and work coal generally lying at much greater depth than before. Over the years it has become clear that the conditions in some of these new sinkings and reconstructions are likely to be less favourable than expected and this has been aggravated by the realization that the economic reserves in many continuing pits must be assessed at figures lower than formerly taken. Thus, in any appreciation of the reduction in the planned output from Scotland, not only has the fall in demand to be considered but also a decline from earlier estimates of possible capacity.

"Strategic Retreat"

The term "strategic retreat" means that the industry is moving in a planned—not a haphazard—way, redeploying its forces in a way that will make them more effective, towards a new position in which we believe the industry will be stronger and more effective.

The process of planned withdrawal started in 1958 with the stopping of Saturday working and the virtual cessation of adult recruitment: it continued in 1959 with the accelerated closure of many pits; it is going on in 1960 principally through the continued ban on recruiting and the accelerated closure of some few pits. In Scotland in 1959, industrial manpower dropped by about 6,000 men and non-industrial by about 500 men. Although there have been individual cases of difficulties, in neither case has there been any real incidence of unemployment. Unless something unexpected happens, the drastic reduction in manpower which is being enforced through the continued ban on recruitment should be over its worst period by the end of this year.

Redeployment in Scotland means the movement of men and management to pits which can give in the future a greater o.m.s. and preferably give it in coals which will be in active demand. That process has been going on too, particularly in these last three to four years, and must continue for some years yet as our new pits and reconstructions develop and build up their outputs. Although disappointments have been experienced in some of the new pits and reconstructions, without them the Scottish coalfields were doomed to a rapid decline. Conditions may well be difficult, but facilities are first-class and the management is in the hands of capable men of the younger school. Of the eight agent/managers for the bigger pits in Scotland, six are under the age of 40. With few exceptions these new ventures will eventually be assets of which the Scottish coal industry will be proud.

The crux of this phase of "strategic retreat" is whether the objectives and the new positions are correct. In the broad sense the objectives must be the same as always, *viz.*, to provide the coal which the country requires and to do so in such a way as will provide fair conditions and reasonable security for all employed in the industry. The new objectives are set out in the "Revised Plan for Coal" in which the fundamental assumptions are that the country will need 200,000,000 to 215,000,000 tons of coal in 1965 and that Scotland can produce and sell 18,000,000 to 20,000,000 tons of deep-mined coal.

Country's Need for Energy

If the first assumption that the country will need 200,000,000 to 215,000,000 tons of coal is correct, then there is no doubt that this framework can readily contain the Scottish target. The proposition on which these assumptions are based is that over the years the demand for energy in this country will grow considerably and steadily. The demand in terms of coal equivalent was about 250,000,000 tons in 1958 and it is expected to grow to about 300,000,000 in 1965. This is the figure adopted by the Government for planning purposes and the most recent prediction, made by Prof. Austin Robinson, set the demand a little lower, at 290,000,000 tons in 1965. The contribution which nuclear power and water power can make by then are reasonably established and will certainly not exceed 15,000,000 to 16,000,000 tons. The balance must come from coal or oil, the relative position being shown in Table 2.

TABLE 2.—*Relative Future Demand for Coal, Nuclear Power, and Oil.*

	Possible contributions to energy needs in terms of coal equivalent.			
	Total.	Coal.	Nuclear and water.	Oil.
	Million tons.	Million tons.	Million tons.	Million tons.
1958 ..	250	205	1	43
1965 ..	300	197	16	77
1975 ..	330/350		30/40	

In other words, the assumption is that over these years coal will gain as much in certain markets, *e.g.*, coke ovens and electricity generation, as it will lose in others, while, generally, the use of oil will continue to grow. Even allowing for the increased contribution from nuclear sources, the same sort of proposition is shown in any projection forward for a further 10 years to 1975. It seems reasonably clear that both industries, coal and oil, will have the technical capacity to produce more of the energy requirements than the figures stated; the question of whether they will do so or not will depend on commercial and perhaps political circumstances, the decisive factors probably being the price relationship of coal and oil.

It is no simple matter to obtain a proper picture of what that price relationship is—it is the delivered

price that really counts and in both fuels the cost of delivery can vary over a wide range. Published information indicated in Table 3, shows that over the last six years the price of coal has risen quite substantially relative to the price of oil.

TABLE 3.—*Relative Price of Coal and Oil* (1954-59).

	1954.	1955.	1956.	1957.	1958.	1959.
Coal	100	112	127	137	141	139
Modern fuel oils ..	100	102	111	133	115	107
Ratio of coal to oil prices	100	110	114	103	123	130

On the present price levels in the industrial belt of Scotland coal would appear to be still the cheaper fuel to use for all except special purposes. But with the rebates which the oil companies sometimes grant the margin can become thin.

Future Price Relationship of Coal and Oil

In the medium and long term the price of coal is going to be influenced primarily by productivity and it seems that the progress already made since 1947, and projected up to 1965, should be achieved in that year and improved on in later years. In 1947, productivity was 21.5 cwt. per manshift; in 1959 it was 27.0 and the estimate for 1965 is between 30 and 31 cwt. One of the main reasons why productivity has not moved even faster in these past years has been the need to limit the production of small coal in order to produce the larger sizes which the current pattern of consumption requires. But, in the longer term, that pattern is changing. The coke ovens and the generating stations—both markets confidently expected to expand—need small coal. The effect of the Clean Air Act is to emphasize the value and need for mechanical stokers in the industrial field—and again these use small coal. The demand for the smaller sizes of coal can, and must be made to grow, and if this is done the production trend for future pricing would seem to be moving the right way.

Concerning more commercial factors, it is fair to say that the board's present prices are too low as is evidenced by a cumulative deficit of over £30,000,000 at the end of 1958. Prices have been established at slightly too low a level and in the 12 years to December 31, 1958, the profits on colliery and ancillary operation, which amounted to £245,000,000, have proved inadequate to meet the charges for taxation, losses on imported coal (which it was necessary to import to meet the demands of the country up to as recently as 1957) and the charge for interest on the capital employed, to the extent that there was an accumulated adverse balance of some £30,000,000 at the end of 1958—equivalent to about 3d./ton on the coal sold during the 12 years. Apart from the recovery of this deficit over the future years, prices are likely to be conditioned mainly by events within the industry. There are no subsidies to be lost, so any change in that direction cannot be for the worse.

In some respects oil will, in the future be more vulnerable than coal to influences other than the normal commercial ones. Consider the political risks in the international field during the last few years. The effect on price of satisfying the growing nationalization of some producing countries and of satisfying the natural—or unnatural—commercial interests of other producing countries in time of crisis could be substantial—as could the costs of storage if this country were to try to hold a reserve adequate against all contingencies.

In the home field the political risk is whether, over the years, coal will be given some protection through import restriction or a tax on fuel oil. Clearly it is not a possibility at the moment, but if one keeps in mind that the agriculture of this country is subsidized out of taxes to the extent of about £215,000,000 a year, presumably because of the danger of allowing the country to become dependent on imported food, it would be wrong to dismiss too lightly the thought of some fiscal action to prevent the country becoming too dependent on imported fuel whether for financial or strategic reasons.

There could, too, be directions by the Government of the day as regards the kind of fuel to be used in nationalized industries.

A further and more commercial point to consider is that, at present, fuel oil is selling below the cost of crude oil. In other words, if its present price is economic—which is open to doubt and impossible of proof—then it is so because of the price level of the other refinery products, principally petrol, kerosene, gas oil, and diesel oil. An increase in the demand for petrol must adversely influence the position for the industry. On the other hand, an outbreak of true competition could well reduce the price of petrol as could technical developments affecting the fuel used in the internal combustion engines, *e.g.*, developments on the lines recently announced by Rolls-Royce. The demand for—and therefore the price—of kerosene, too, could well be affected by a new attitude on the part of the public. This has only shown itself recently in this country, but emerged some time ago in the US. In New York City, for example, the use of paraffin heaters, whether portable or fixed, is forbidden under a law passed in 1955 and which became effective at the end of 1959. It is understood that such regulations are by no means confined to New York.

It is easier to state some of the pros and cons which could affect the future price relationship of coal and iron than it is to reach a conclusion, but there is no solution to the problem of the mining industry through increases in the price of coal in excess of any general movement of prices in the country.

Position in Scotland

The national objectives and those for Scotland are the same. The questions are whether the objective—to produce and sell, say, 19,000,000 tons of deep-mined coal—is correct and, if so, what can be done to make that position a secure one. There is little doubt that we will have the technical capacity to produce this tonnage and, with an

imaginative and forceful approach, we have the ability to create the conditions in which we can be sure of selling it. These conditions will revolve round selling, service, and suitability and, of course, price.

The biggest single market in Scotland will be coal for electricity generation and we can reasonably expect this to continue to increase over the next five to 10 years. After that new coal-burning stations will be needed. The next biggest market will be the coke ovens producing coke for the steelworks. Despite the substantial reduction in the amount of coke per ton of iron, this market should also increase and, subject to some quite new technical process, should now be relatively stable in line with the general level of industrial activity in the country. Gasworks come next and here a decline can be expected, principally due to changes in the traditional methods of gasmaking, including the advent of total gasification in the Lurgi plant at Westfield. The amount of coal taken by the railways for use in their locomotives is also likely to be reduced. This is partly due to their programme of applying diesel locomotives and partly to the industry's inability to produce and supply the large coal required. Individually, these are Scotland's largest markets and along with internal requirements for colliery consumption and concessionary coal, represents over 55 per cent. of the probable demand for Scottish coal.

The balance of the home demand comes from iron and steel works, engineering works, general industry of all kinds, public buildings and institutions, commercial warehouses and offices, and, of course, the domestic market. It is in these markets that competition is primarily with oil and is likely to be most intense. Comparability of price will, of course, be a fundamental, but, given that, it is the other factors of selling, service, and suitability that can be decisive. It is in these directions that those in the industry have to be forceful and imaginative. Table 4 shows the consumption of oil in Scotland during the last five years.

TABLE 4.—*Scottish Oil Usage.*

Year.	Tonnage of fuel oil in competition with coal.	Thousands of tons coal equivalent.
1955	618	1,233
1956	748	1,471
1957	808	1,566
1958	1,008	1,972
1959	1,142	2,196

The National Coal Board's advertisements, linking progressive industry with coal, have given a lead and each division has made a start by increasing the number of men whose job it is to sell and give service. The Scottish Division has increased the number of its commercial representatives who call on users of coal to see they are satisfied and to help in ensuring they get the best value for the money they spend on coal. A small staff of trained fuel technologists has been recruited whose services and advice are freely available to all industrial and commercial and institutional users. Shortly, a small staff of stoker-demonstrators is to be recruited whose services will also be freely available. The demand for these services will be such that they are bound to grow and provide good openings for advancement in the industry.

In the domestic market a background advertising campaign has been started and the board has now arranged for credit terms comparable with those offered by the oil companies to be available to those who want to buy the most modern and effective appliance for heating in the home. In Scotland a start has been made in the packaging of coal and developments from this may well be the start of major changes in the service of the domestic market.

To retain our business we have first to sell, then we have to give service and, to the customer, service means primarily getting what he ordered both in quality and quantity when he wants it. Service also means being served by an industry that brings forward new ideas and methods that help him to get better value for his money. In both these directions we have much to do. The difficulties to be surmounted to ensure that the coals that leave the pits are clean and consistent and reasonably free from cause for complaints, are well known. We have less complaints than before. This is welcome news, as the damage a complaint can do today is far greater than at any time since the war.

After coal has left the pit there is a great need and a great field for service designed to give consumers better value for money. But we need more new ideas, new experiments to improve the traditional ways and means of delivering coal, of storing coal, of burning the particular kinds of coal we have in plenty, of dealing with ashes. It might be said that this is not our job, that our job is to produce coal: maybe so, but this affects our living.

Problem of Small Coal

To increase productivity full advantage will have to be taken of power loading and other means of mechanizing the production and handling of coal. That by its nature is apt to mean more small coal. In the long term this will suit the pattern of demand. But now we are reaching the stage where it is increasingly difficult to meet the demands of the markets for sized coals from singles upwards without creating surpluses of pearls, duff, and dross. The remedy to this problem must lie in the pit. It is vitally important to increase the make of sized coals without being forced to forgo the advantages of mechanization, and nowhere is the position more urgent than in Scotland.

Looking to the future, however, the problem will not be solved in the pits alone. Demand must be stimulated for these surplus sizes; the use of the price mechanism may help, but eventually developments in boilers and mechanized stokers are needed so that they will readily use these small coals. In the domestic and institutional markets there are only a few appliances using bituminous coal on the market of under 200,000 BThU capacity which will

meet the requirements of the Clean Air Act. The trend today is towards central heating and unless this new and growing market is to be lost, a small appliance, suitable for the householder and institutions is needed that will use small bituminous coal and burn its own smoke.

Prices

One of the early decisions made by the board was to establish its policy for fixing prices within the conditions laid down by the Nationalization Act. It decided that prices should be fixed on a national basis with only relatively small adjustments to reflect divisional considerations; that the basis for the price level should be the national costs of industry; and that within this level the prices of individual coals would be determined by reference to a price structure based on the quality and heat value of the coal. Industrial prices are so fixed, with the buyer taking the advantage, or disadvantage, of his geographical situation in relation to that of the supplying pits.

On this basis it is clear that the price to be charged for coal in the future will be influenced by movements of cost in the national field rather than in the individual divisional fields. The board has stated that its future policy is one of price stability. There will be the need for adjustments as between sorts and sizes, and perhaps for compensating local adjustments, but provided productivity keeps rising it should, over a period of years, be possible to hold the price level without a general increase.

That is not the end of the matter in Scotland. One of our objectives should be that there are fair conditions and security for all employed in the industry. To ensure that security, we in the Scottish Division must so conduct our affairs as to reduce to a reasonable size the gap that exists between the results—measured both by productivity and in financial terms—of Scotland and of the rest of the country. There has been a willingness on the part of others in the industry and on the part of the public in general to accept the burden which those years of reconstruction, with all that it implies, have imposed on the division. But that period is passing and we should establish the target we are aiming for and make sure we reach it.

Target for Scotland

Given a price structure based on national productivity and costs, Scotland's financial results are not likely to be as good as those of Great Britain as a whole. The objective must be to break even on colliery operations on the basis now being used. A very broad assessment indicates that this can be done if an o.m.s. of between 27 and 28 cwt. is achieved and at the same time effect a reduction in the fixed expenses. Productivity has been rising; in 1958 it was 19.8 cwt.; in 1959 it was 21.3 cwt., and in the first three months of 1960 it will be about 22.4 cwt. The tasks of maintaining that rise, of combining the benefits of mechanization with the provision of the sorts and sizes of coal the market needs, depend largely on the skill and enthusiasm of the individual managements.

The other requisite for long-term security is a reduction in the weight of fixed expenses and here there is a danger that people may think that the only way this can be done is by reducing the number of staff in the board's service. This is not so. Over the years there will be a reduction in the numbers employed and some redeployment. The reduction in demand and the concentration of output in fewer pits makes this inevitable, but given some success in continuing the improvement in the level of productivity and control of expense, the timing will not be such as to cause any widespread redundancy, or slow down too drastically the advance of well-earned promotion.

Much of the saving required must come from the accumulated effect of small things; from careful management ensuring that consumers get the best value for money.

Another field in which there is still scope for financial improvement lies in what is generally described as industrial relations, the way in which management over the years can influence the pattern of conduct of the men. Consider absence. The absence rate today is about 13 per cent.; if it could be reduced to 10 per cent., a saving at the rate of £300,000 a year could be effected. Management would have fewer worries and the men higher earnings. Consider also accidents. Quite apart from their toll in human suffering, accidents will probably cost the Scottish Division about £750,000 in claims in 1960. It will be no easy task to reach the break-even position, but this target can be achieved in the next five years.

Conclusion

Changes in the future plans for the mining industry in Scotland arise primarily from reduced demand due to:—(1) The decline in the export market; (2) the relatively slow rate of advance in industrial activity in Scotland; (3) technical developments, particularly in the making of gas and steel and in the railways; (4) the success of oil in encroaching on the general industrial and institutional market, and (5) the need to reassess the reasonable capacity of the Scottish mines.

The new objective can be achieved. But not easily. It will need all the ability and ingenuity, enthusiasm, patience that can be mustered. But it can be done.

APV's Golden Jubilee

June 10 marks the golden jubilee of the APV Company, Limited, Manor Royal, Crawley (Sussex). The company was started in Wandsworth, London, in 1910 by Dr. Richard Seligman, as the Aluminium Plant & Vessel Company, Limited, to develop commercially a patent for the welding of aluminium. It was the first company to produce large vessels in aluminium, the industrial application of this metal previously having been handicapped by the difficulty in welding. Today the APV Company employs nearly 2,000 people and it has created a large oversea organization based on eight associated companies.

Mining Oversea

in which we review, from time to time, interesting mining matters reported by our contemporaries abroad

COAL-FINES PROBLEMS IN USSR

INCREASED mechanization of Russian collieries has caused an increase in the proportion of fines. For the anthracite coal of the Donbass the increase was 57.6 per cent. in 1958, compared with only 42.2 per cent. in 1940. The growing use of oil and natural gas in electric power stations has also reduced the market for anthracite fines.

In the Rostovugol group, determined efforts are being made to produce less fine coal and these include a reduction in explosives consumption, improved ground breaking mechanisms on cutter loaders, and replacement of scraper conveyors by belt conveyors. The result has been a reduction in fines from 47.8 per cent. in 1958 to 42.8 per cent. in the first quarter of 1959.—Ugol, December, 1959.

MONORAIL TRANSPORT

ESCHWEILER collieries, near Aachen, West Germany, have had monorail installations in service underground for a number of years. Standard flat-bottom rails, 8 ft. long, are used for the track, and are suspended from the roadway support by C-shaped brackets. A special carriage for the transport of steel arches is shown in Fig. 1.

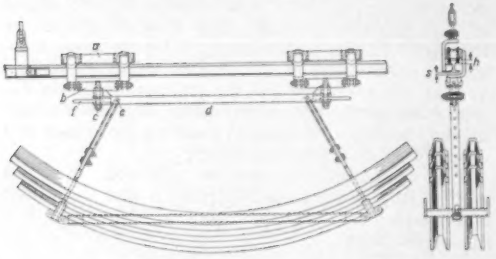


FIG. 1.—MONORAIL CARRIAGE FOR THE TRANSPORT OF STEEL ARCHES.

a—Trolley; *b*—Distance piece; *c*—Swivel; *d*—Tie bar; *e*—Bolts; *f*—Rope attachment; *h*—Wheel flange height; *s*—Clearance below rail, smaller than *h*, thus preventing derailment.

Other carriages have been developed for mine timber, dirt, and machinery spares. One for the transport of conveyor drives and pans is fitted with a hoist for lifting heavy articles. The collieries of this group have 36,000 ft. of monorail in service and additions are constantly being made.—W. SPRENKER, Glükhauf, January 16, 1960.

DUST SUPPRESSION IN FRANCE

PROPORTION of coal won by air picks in the northern French coalfield has dropped from 80.7 per cent. in 1955 to 69.6 per cent. in 1957. The principal dust-suppression measure is water infusion, which is applied in 80 per cent. of the faces.

Wet coal picks are still in the experimental stage and only 28 are employed out of a total of 21,253 coal picks. In the Lorraine coalfield, 86 per cent. of the coal is won by explosives with or without coal cutters. All seams are very wet and the hardness of the coal and absence of cleavage rules out infusion, so that spraying before shotfiring is the general rule. Blasting by high-pressure compressed air is being tried in a good number of gassy districts, but the results of these tests are not yet conclusive. Similar conditions prevail in the Loire, Auvergne, and Blanzy coalfields.

In the Lorraine iron-ore mines, liquid oxygen is most often used as the explosive and, as the ore is damp, no special precautions are needed against dust. In the western iron-ore mines, however, 21 per cent. of all workings are dry and spraying before shotfiring is practised.—Report by International Labour Office, Annales des Mines, January, 1960.

FLUORESCENT MINERS' LAMPS IN RUSSIA

THE best xenon-filled lamp bulbs in miners' hand lamps have a specific lighting efficiency of only 12 to 13 lumen/W, as against 30 to 35 lumen/W of a 50 cycle a.c. fluorescent lamp. Efforts have been made in the USSR to perfect a suitable unit which could be supplied from a 3 to 7-V d.c. battery.

Instead of using a high-voltage battery, the current from a low-voltage d.c. battery is transformed by a vibro-invertor into a high-voltage alternating current. The principal data of three of the most promising types of lamps developed are given in Table I.

TABLE 1.—*Details of Three Types of Fluorescent Lamps.*

	Type		
	LAC-6	LAC-8	LAC-10
Light flux, lumens ..	80	90	220
Weight of fittings, lb. ..	8½	7½	7½
Battery voltage	2.5	2.5	7.5
Capacity, amp.-hours ..	24	24	10
Weight, battery, lb. ..	4	4	5½
Invertor	Vibro-type	Semi-conductor type	Semi-conductor type

The "Elektroarmatura" lamp works in Lvov is at present preparing the production of the type LAC-6—V. B. MITNIK, Ugol, September, 1959.

INEFFICIENT USE OF COMPRESSED AIR

INEFFICIENT pipe and hose connections impair the performance of compressed-air machinery. In one case in a German mine the air pressure to an air-turbine driven mine fan was found to have dropped from 60 lb./sq. in. at the main to 15 lb./

sq. in. At this low pressure the fan had only half its rated air flow capacity and one quarter its rated water gauge. In a similar case it was found that by simply replacing the existing ¾-in. dia. rubber air hose by a hose of 1¼ in. dia. the mine fan delivered the same quantity of air through a much greater length of 24-in. dia. ventilation tubing. The increased length was found to be 3.6 times that of the previous length of tubing served by the fan with the ¾-in. dia. compressed-air delivery hose.—W. Voss, Glückauf, February 13, 1960.

SHAFT SINKING THROUGH WATER-BEARING STRATA

IN the Ruhr district, the No. 3 shaft of Hans Aden Colliery was sunk to a depth of 1,710 ft. with a diameter which varied from 28 ft. 11 in. to 31 ft. 2 in. in exceptional circumstances. Mining operations were in progress in five coal seams within the boundaries of the shaft pillar so that special precautions were necessary when the water-bearing strata above the Coal Measures had to be passed.

Cementation holes, 230 ft. deep, were drilled from concrete slabs at the shaft bottom and Fig. 2 shows a special rotating stage on which the drilling machines were mounted. The shaft was lined with

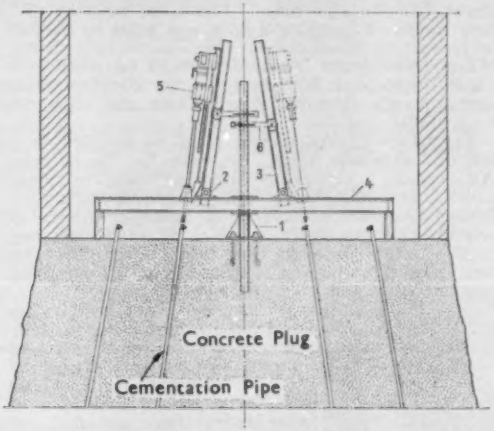


FIG. 2.—SECTION THROUGH ROTATING DRILLING PLATFORM.

1.—Standpipe with bracket. 2.—Hinged pedestal for drill carriage. 3.—Tiltable drill carriage. 4.—Rotating drill stage. 5.—Drilling machine. 6.—Telescopic support for drill carriage.

brickwork of about 2 ft. 6 in. thick over most of its depth. The water influx in the finished shaft is less than half a pint per minute and a twin brick-wall lining, which was expected to be necessary, was omitted.—F. MOHR, Glückauf, October 10, 1959.

SEMI-AUTOMATIC DRILL BIT GRINDING

IN the metalliferous mines of the Krivoi Rog district of the USSR 10,000 drill bits have to be reconditioned and re-ground each month. In order to save time and labour, the Gyprorudmasch Institute designed and built a semi-automatic grinder, incorporating an electric motor with two shaft ends.

Each shaft end carries a grinding wheel. A face plate in front of each wheel rotates at a speed of 3 r.p.m. and the 15 detachable tungsten carbide tipped bits are clamped to the face plate in the manner shown in Fig. 3.

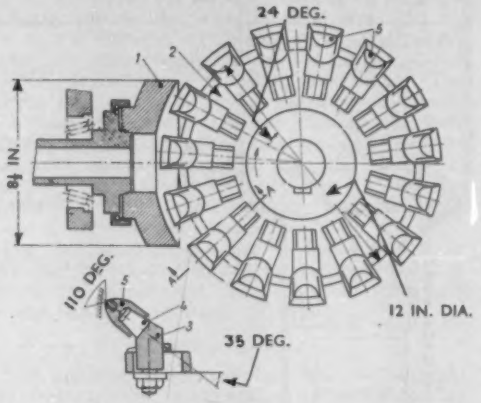


FIG 3.—ARRANGEMENT FOR GRINDING DRILL BITS.

1—Grinding wheel; 2—Face plate; 3—Bit holder; 4—Taper end; 5—Drill bit.

All the 15 bits are re-ground to the correct angle on one side of their cutting edges. The bits are then turned by 180 deg., re-clamped, and ground on the other side. Grinding both sides takes 5 min. It is claimed that field tests have proved a 50 per cent. longer life per re-grind for the semi-automatically ground bits compared with hand grinding.—Bergbautechnik, January, 1960.

LARGE BOREHOLE FOR SHAFT DEEPENING

WHEN the No. 8 shaft of the Belgian colliery Houssu had to be deepened from the 2,670-ft. level to the 3,067-ft. level at a useful diameter of 13 ft. 9 in., it was decided to drill a pilot hole of 32 in. dia. upwards from the lower level and to sink the shaft to the excavated diameter of 16 ft. 5 in.

A small hole of 7⅞ in. dia. was drilled from the bottom and then reamed downwards to 12 in. dia. (Fig. 4). This was followed by simultaneous reaming in three stages to 16 in., 24 in., and 32 in. dia. A rope, attached to a compressed-air hoist, followed the reamers in the hole and facilitated extraction in case of drill steel fracture. The total deviation was found to be 7 ft. 3 in. in spite of attempts to correct for anticipated deviation, but the hole arrived within the cross-sectional area of the shaft. A delay of 20 days was caused by two drill steel fractures. The total length of borehole of

365 ft. required 42 eight-hour shifts or 166 man-shifts. The average drilling per shift was 8 ft. 4 in. referred to the finished 32-in. dia. hole. The wear of the tri-cone roller bits, particularly in the sandstone beds, was found to be heavy and a complete

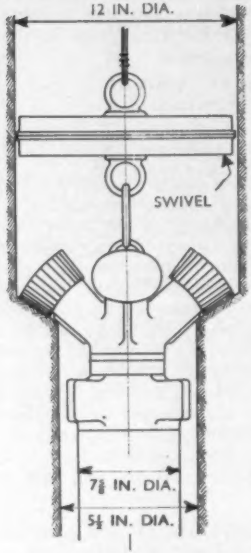


FIG. 4.—REAMING A 12-IN. DIA. HOLE IN PREPARATION FOR SHAFT DEEPENING AT A BELGIAN COLLIERY.

set of bits and reamers was worn out in the 365 ft. of boring. The cost for the bits constituted 38.18 per cent. of the total costs for the borehole and it is hoped that improvements in the design and manufacture of roller bits will reduce this item in future. —P. SANDRA, Annales des Mines de Belgique, December, 1959.

SMRE Bibliography

A SECOND edition of the SMRE Bibliography (177 pp.) has been published by the Safety in Mines Research Establishment, Ministry of Power, Portobello Street, Sheffield 1, price 17s. 6d. It is a bibliography of the published work of the staff of the Safety in Mines Research Establishment and of the establishment's predecessors and other workers for whom these bodies provided facilities, research contracts, or grants. The first edition covered the period 1921 to 1952. The second edition has been considerably expanded, and covers the period from the foundation of organized research in 1908, under the auspices of the Mining Association of Great Britain, to the end of 1959.

The new items include 126 SMRE research reports published since 1952. References to 1,512 official publications, visual aids, and contributions to the technical Press, are arranged by subject in order of the Universal decimal classification. Series, author, and subject indexes are provided.

Details of translations of contributions to international conferences of directors of safety in mines research, which have been published by SMRE with the authors' permission, are included in an appendix.

Firedamp Drainage

DRAFT General Regulations which he proposes to make under the provisions of Section 141 of the Mines and Quarries Act, 1954, have been circulated by the Minister of Power. The Regulations, which will apply to coal mines and will come into force on July 1, 1960, govern the collection of firedamp before it has been diluted by the ventilation of the mine and its safe disposal. They do not apply to any system which consists merely of a pipe placed in a roadside pack for the purpose of collecting firedamp which has accumulated behind the pack and conveying it to a point in the road where it can be discharged safely.

The Regulations require that no borehole shall be drilled for firedamp before a pipe is available to collect any firedamp that may be tapped. Boreholes must be drilled wet and means must be provided to seal the hole in the event of a sudden flow of firedamp from it. Means must be provided for measuring the firedamp content of the gas flowing from the borehole. Stand pipes must be sealed in the borehole from which they lead and must be joined to the pipe range by a flexible connection.

Pipe ranges must not be installed in intake shafts or outlets. They must be properly supported and identified by yellow bands. Valves must also be identified by yellow paint. Means must be provided for sampling the gas and for draining water from the range. When any pipe is joined into a pipe range measures must be taken to minimize the amount of air drawn into the pipe range. Exhausters must be of a type approved by the Minister and must be earthed to prevent the accumulation of an electro-static charge. When an exhauster is stopped it must be possible to allow firedamp to flow freely to the discharge point and a reverse flow through the exhauster must not be possible.

Exhausters on the surface must be installed in a special "exhauster house" set aside for the purpose. All electrical equipment in exhauster houses or calorimeter rooms must be intrinsically safe or flameproof. Naked lights are prohibited in exhauster houses or calorimeter rooms, except where necessary for operating flame-type calorimeters. After July 1, 1961, any flame type calorimeter must be contained in an independently ventilated enclosure.

Discharge points, other than those into a utilization plant, must be kept free from anything likely to ignite firedamp. Discharge points on the surface must be equipped with flame traps. Any firedamp discharged into a utilization plant must contain not less than 40 per cent. of inflammable gas. Below ground firedamp must not be discharged into an intake airway; any discharge point below ground must be surrounded with a fence, at which the percentage of inflammable gas in the air must not exceed 2 per cent. Any exhauster or pressure control chamber in a firedamp-drainage system must be in the personal charge of a competent person appointed by the manager.

AEF Engineering Review

The first issue of an interim edition of AEI Engineering Review has been published. It deals with all the products of Associated Electrical Industries, Limited, and with the technical work and research of the company as a whole. It replaces BTH Activities, M-V Gazette, Siemens Edison Swan Journal, and Henley's Distribution of Electricity. The interim edition of the review will come out every two months until the end of the year, after which it will appear monthly.

Cold-plate Bending Machine

Installation at Erith Engineering Works

RECENT installation and commissioning of a three-roll cold-plate bending machine at the Erith Engineering Works of the General Electric Company, Limited, enables the company to bend mild-steel plate up to 4¾ in. thick. This is believed to be the largest machine of its type in this country and its installation enables the company to bend the thickest plate likely to be encountered in pressure-vessel work. The bending machine has already been used to roll sections of the shells of winding engines and for work in connection with machines for Hunterston nuclear generating station.

Supplied by Wagner & Company, Dortmund, Germany, through its British agents, Vaughan Associates, Limited, the machine weighs 126 tons and has approximate overall dimensions of 42 ft. by 13¾ ft. by 17½ ft. high. The total cost, including import duty but excluding installation charges, was approximately £82,000.

Pre-bending and Bending

The rolls can be used for both pre-bending and bending. Pre-bending is the term used when the ends of a plate are formed, while bending refers to the actual rolling operation. Pre-bending is an essential requirement for rolling true cylinders of which the machine is capable.

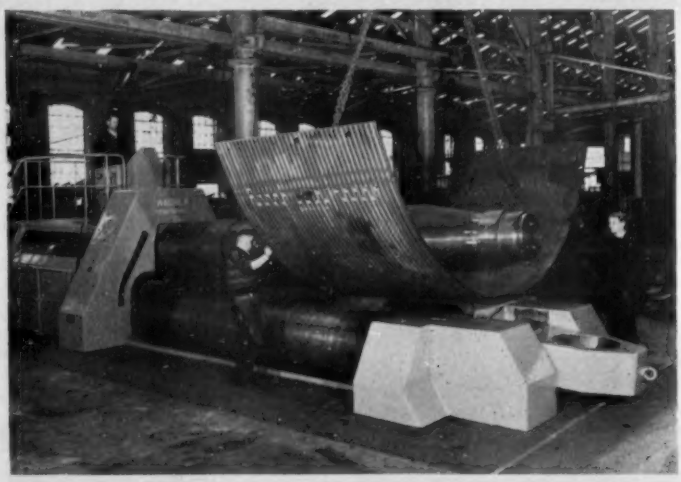
The new rolls pre-bend steel plates (32 ton/sq. in. tensile) 13 ft. 1½ in. wide by 2$\frac{29}{32}$ in. thick or 6 ft. 6¾ in. wide by 3 in. thick; the corresponding thicknesses for bending are 3$\frac{29}{32}$ and 4¾ in. The minimum plate thickness which can be rolled is ¼ in., the minimum diameter depending on plate thickness and width. Certain plate sizes can be bent to the diameter of the top roll, namely 2 ft. 7½ in. Bending speeds are 16.4 ft./min. and 9.8 ft./min., depending on the plate dimensions. The bottom rolls are vertically adjustable individually as a combined unit, and this enables the new machine to roll the plates and pre-bend them at both ends without having to turn the plates. It therefore incorporates the advantages of the normal three-roll plate-bending machine with those of the four-roll machine.

The two main motors are of the wound rotor type, the pre-bending unit being rated at 107 h.p. for vertical adjustment of the bottom rolls, and for the bending operation, 167 h.p.

Machine Details

The machine body comprises the two upright end frames, one incorporating a drop bearing and the other a tilting bearing, the adjustment drive mechanism, and the gearbox. The roll journal on the drop bearing side is protected by a closed bushing which remains on the roll when the drop bearing is swung down. Operation of the drop bearing is by a reversible-type hydraulic pump developing about 7 h.p.

The rolls are of high-quality carbon steel and run in bronze bearings located in the two end frames. The bottom rolls, which are 2 ft. 6¼ in. dia., are fitted with articulated bearings which



THE REMOVAL OF A ROLLED SECTION NECESSITATES THE OPERATION OF THE DROP BEARING AND THE TILTING OF THE TOP ROLL AS SHOWN. THE WORKPIECE IS A ONE-THIRD SECTION OF THE SHELL OF A 16-FT. DOUBLE DRUM WINDER FOR INSTALLATION IN A BRITISH COLLIERY. THE MILD-STEEL PLATE IS 6 FT. 6 IN. WIDE AND 2 IN. THICK.

permit the inclination of the rolls for bending conical shells with a maximum angle at the apex of 20 deg. The top-roll tilting device is a necessary feature of the cold-plate bending machine since it enables the removal of closed shells. Inclining is effected by an oil cylinder supplied at both sides and sited at the driving end of the machine. The bearing in the frame at this end acts as a pivot for the tilting roll.

The adjustment of the bottom rolls can be effected during the bending operation, the drive being specially strengthened. The adjusting gears for this purpose are located in the end frames, and the three-phase driving motor is mounted on the end frame close to the gearbox, being connected to the bottom rolls at this end through reduction gearing. The drive is transmitted to the drop bearing end of each roll via a clutch and cardan shaft. The two hydraulic multi-disc jaw-type clutches provide a safety device against overload, besides permitting the bottom rolls to be inclined for conical bending. The arrangment also allows both rolls to be operated as a single entity as indicated earlier. All high-speed shafts run in roller bearings and the low-speed shafts in large slide bearings.

Multi-disc Brake

The bending drive acting on the bottom rolls is located in a separate gearbox, two hydraulically operated clutches permitting the choice of the speeds indicated earlier. The relevant three-phase 165-h.p. motor is positioned between the two end frames. To reduce so far as possible the idle running of the rolls when pre-bending and bending the plates, an electro-hydraulic actuated multi-disc brake is incorporated. This is additional to the reverse current braking system fitted to the drive motor.

The lubrication of the roll adjustment drive is effected through a centrally arranged oil circulation system. The reduction gearing lubrication is by oil bath or oil spraying. The main greasing points are supplied by a centrally placed high-pressure greasing system, the power for which is taken from the bending drive. All other lubrication points are arranged in groups and supplied by manually operated grease pumps. A special low-pressure oil system is provided for the actuation of the multi-disc clutches in the adjustment drive and similarly for the jaw-type clutches controlling the speed of the bending drives, and for the inclination of the bottom rolls. A special gear pump is fitted to supply this low-pressure oil system.

The control of the rolls is effected from a raised platform, where all the indicating devices are grouped conveniently together in a control console. The console has two kW meters for measuring the power taken by the rolls during pre-bending and bending operation; device for indicating the relative position of the bottom rolls, particularly necessary for conical rolling; control switches, and indicating lamps.

Electrical Details

The electrical supply is brought in through a 2,400-A three-phase contactor fitted with under-voltage and magnetically operated overload releases. Some of the safety interlocks are arranged to trip this contactor should mal-operation be attempted. The main driving motor and that for the adjustment of the bottom rolls are of the wound rotor type with speed control by resistance in the rotor circuit. The former is controlled by a five-position switch, each position being associated with an electronic timing relay with 0.1 to 5 sec. settings. Each of the five relays operates a contactor to cut out a section of the resistance in the rotor circuit when a certain speed has been attained, the final contactor short-circuiting the motor sliprings. Control of the adjust-

INSERTING A 2-IN. THICK MILD-STEEL PLATE INTO THE BENDING MACHINE FOR ROLLING TO 16 FT. DIA. THE BOTTOM ROLLS CAN BE ADJUSTED WHILE UNDER LOAD.

ing motor speed is identical except that a four-position switch is employed. The rotor resistances which are of normal grid-type pattern are cooled by a special fan unit. Reversal of both motors is effected by changing the incoming connections through parallel contactors.

In addition to the normal electromagnetic brake, each motor is fitted with an a.c. injection system of reverse current braking, the operation of which is controlled by a brake monitor fitted on to the driving shaft of each motor.

The maintenance of the oil flow for the hydraulically operated equipment is an essential requirement and it is therefore interlocked with the operation of the motor drive. Satisfactory operation of the hydraulic system is indicated by a green light on the control console, which is arranged to flash should oil circulation fail: a klaxon also sounds under these conditions. A 7½-h.p. three-phase oil pump motor maintains the hydraulic pressure at around 515 lb./sq. in.

The relative position of the bottom rolls is indicated by "Magslips," a receiver being fitted at each end of each roll, and a corresponding transmitter on the control console. The rotor circuit of a transmitter and its appropriate receiver are connected in series and are supplied with a 240-V single-phase voltage: the stator windings are also interconnected. Any movement of a bottom roll is translated into inches displacement from a given datum, and shown on a counter-like dial on the control panel. By this means both rolls may be set horizontally or inclined to any angle up to 10 deg. for conical rolling.

The 185-V d.c. supply for the many solenoid-operated hydraulic valves is obtained from a selenium rectifier connected to the main incoming control panel.

Metallurgical Patents in the US

THE following descriptions for metallurgical patents have been taken from details given in the Official Gazette of the United States Patent Office.

High-temperature Heat-treatment of Metals

An elongated high-temperature heat-treating furnace horizontally positioned on a supporting surface in parallel relation thereto comprises a rear wall and longitudinally elongated wall extending forward therefrom, defining an elongated tubular recess in, and terminating in a free edge defining an open front face of the furnace. The recess extends from the open front face to the rear wall. An elongated first casing having an end wall slightly smaller than the furnace wall in dimensions is transverse to the furnace, the first casing tubular wall extending forwardly therefrom and of less length than the furnace recess. The first casing is inserted into the furnace recess with the free end of its wall substantially in the plane of the front face of the furnace.

A second casing comprising an end plate as large as the open front face of the first casing and second casing tubular wall is secured to the end plate of slightly less length and cross sectional dimensions than the first casing, the lower portion of last-mentioned wall supporting the parts to be heat treated in the furnace. The free edge of the first casing is slightly spaced from and secured to the end plate of the second casing, a gas pipe being secured to the end plate in registry with an aperture provided in the plate, for passage of gas under pressure into the second casing and thus over the parts therein and through the restricted, long passage defined by the wall of casings and thence laterally past the front face of the furnace. A door is positioned against the front face of the furnace and against the end plate of the second casing, and slotted to clear the gas pipe and allow the door to slidably move laterally relative to the front face of the furnace.—2,931,636.

Apparatus for Annealing Steel Bars

Apparatus for supporting an elongated bar in a horizontal position to be electrically heated for annealling comprises a plurality of bar-supporting devices located in spaced relation along the bar supporting axis, each of the supporting devices comprising a pair of co-operative supporting members, one of which is movable in relation to the other. Means provide for actuating the movable supporting member to a first position wherein the ends of the supporting members are overlapped so as to establish between the end faces thereof a bar receiving and supporting notch and thence to a second position wherein the bar is released from the notch. Roller tracks are located laterally of and above the bar-supporting axis for feeding bars parallel to themselves in succession to the supporting devices, while roller tracks are located laterally of and below the bar-supporting axis and on the same side of the axis the bar-feeding means for discharging the bar after annealing and release from the bar-supporting devices.—2,931,641.

Continuous Casting Apparatus

A method of continuously casting a metal comprises feeding molten metal from beneath a surface of a pool thereof against a longitudinally moving member, carrying the metal as a laterally confined stream synchronously with such member through a chilling die, cooling the metal less on the die contacting surface than on the moving member, and extracting heat from the metal to solidify it as the metal is carried through the chilling die.—2,931,082.

Drum-pump Dust Sampler

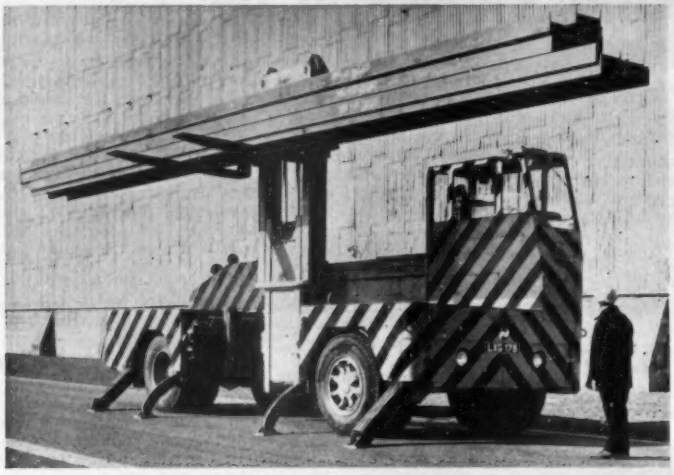
Research report No. 184 by G. E. Winder, published by the Safety in Mines Research Establishment, Ministry of Power, Portobello Street, Sheffield 1 (price 2s.), describes a long-period sampling instrument which collects automatically over a working shift a single sample of airborne dust in the respirable range. The sample is collected on filter paper held in a detachable clip. It may be evaluated densitometrically or by air-resistance measurement. The instrument makes use of a small water-sealed vane-type pump driven by clockwork and is self-contained, portable, and simple to operate. Special features of the design and the laboratory performance are discussed in detail. The instrument has become known as the drum-pump dust sampler.

"Traveloader"

Handles Heavy Beams at Lackenby

PRODUCTS of the modern universal beam mill of Dorman Long (Steel), Limited, namely, long lengths of beams from 36 in. to 6 in. deep, are now being handled very efficiently with the help of the "Traveloader," a heavy duty side operating transporter capable of lifting and carrying loads up to 15 tons. This was evident at a recent demonstration by Dorman Long (Steel), Limited, and Materials Handling Equipment (Great Britain), Limited, 40A, Dover Street, London, W.1, which is the sole concessionaire for the UK for these machines.

The operator of one of these mammoth forklift trucks was seen to manœuvre the vehicle alongside a stack of 54-ft. long beams, set down its four stabilizer "feet," adjust the height of the fork, advance the fork under the required tier of beams at the midway position, lift the beams, and retract and lower the fork so that the beams were resting on the loading platform. Then, after raising its stabilizers, it moved off with its load, the complete one-man operation taking only 1½ min. At the rail siding a few minutes later similar operations were carried out just as quickly, as the beams were loaded on a railway wagon.



THE "TRAVELOADER" IN ACTION AT LACKENBY.

Minor Changes in Design

At the Lackenby mill the "Traveloaders" are fully occupied in the handling of beams, but by way of demonstration the lifting of a railway container from the floor and the loading of it on a lorry was carried out successfully in less than 2 min. However, for routine use in this way it was obvious that some minor changes in design, or perhaps the provision of a periscope, would be desirable to assist the operator in his manœuvres.

The introduction of heavy duty side-operating forklift transporters at the Dorman Long universal beam mill at Lackenby is a direct outcome of the success in obtaining export orders for beams and columns.

Material for export has often to be held for varying periods before shipment, and to meet this requirement it was necessary to have facilities for stacking beams along the whole length of the floor of the gantry adjoining the finishing banks of the mill. The side-operating unloaders, which supplement the four overhead cranes with which the gantry is equipped, assist in keeping handling and storage costs to a minimum. They are particularly useful in the stacking, handling, and unloading of beams outside the mill where crane facilities are not available.

Two of these transporters are to be specially insulated so that when necessary they can handle hot blooms from the blooming mill and stack them in this condition.

Dorman Long (Steel), the first steel concern in this country to adopt this modern method, is finding the "Traveloader" to be a flexible means of handling an enormous tonnage of beams, enabling at the same time, substantial savings in time, space, labour, and expensive overhead cranes.

Toxicity of Dust Study

A study of the toxicity of dust using the in-vitro dehydrogenase technique has been made by Dr. J. Marks and Dr. G. Nagelschmidt and is published as research report No. 186 by the Safety in Mines Research Establishment, Ministry of Power, Portobello Street, Sheffield 1 (price 1s. 9d.). Macrophages were incubated with dust and their capacity to reduce tetrazolium (dehydrogenase activity) was measured. The quantity of dust which reduced the activity of a standard cell culture by 50 per cent. was called the toxic dose. A comparison was made between the toxic doses of various types of dust and previous observations on the fibrogenic activity of similar dusts made in intact animals.

COAL MINING IN CZECHOSLOVAKIA

Report by NCB Technical Delegation

AT the invitation of the Czechoslovak Government, the National Coal Board sent a technical delegation to the Czechoslovak coalfields in August, 1959. The board has now issued a report prepared by the delegation as a result of the visit. The members of the delegation place on record their appreciation of the friendliness which existed and the kindness with which they were received throughout their stay.

The delegation was in Czechoslovakia from August 4 to September 3. It consisted of:— Mr. H. E. Collins, board member for production; Mr. J. Brass, production director, Northern (N & C) Divisional Coal Board; Mr. J. H. Mitchell, deputy director-general, industrial relations department; Mr. H. H. Shaw, head of productivity and costs branch, production department; Mr. N. Siddall, Area general manager, No. 1 (Bolsover) Area, East Midlands Divisional Coal Board; Mr. A. M. Wandless, director of scientific control.

Hard Coal

The main hard-coal region in Czechoslovakia is in the Ostrava-Karvina area, where an output of 22,700,000 tons was projected for 1960, an increase of 22.2 per cent. on the 1956 output. The delegation reports that extraction in the Ostrava-Karvina field is from mines averaging 1,650 to 3,250 ft. in depth with seams from 16 in. to 6½ ft. thick, or in excess of 6½ ft. in exceptional cases. Ostrava-Karvina is the main region for the coking-chemical industry and gross production of coking coal in 1960 was projected at about 19,000,000 tons.

The development of production in the other minor coalfields is proceeding proportionately; these coalfields generally supply coal to local industry and to households.

Brown Coal

The largest brown-coal area is in the Most district, in northern Bohemia. Of the total brown-coal production projected for 1960 about 43,000,000 tons (an increase of about 37 per cent. on 1956 production) is expected to come from this area. The output from the deep brown-coal mines in the Most district is only expected to be about 10 per cent. more than in 1956, whereas open-cast production at 31,800,000 tons envisages an increase of about 50 per cent. This high rate of increase in open-cast production will be achieved by intensive mechanization.

In the Sokolov region, the projected 1960 output is 16,400,000 tons, an increase of 36.5 per cent. on 1956 output, of which over 14,500,000 tons is expected from open-cast mines, an increase of over 55 per cent. on 1956. Deep-mined production in this region is being exhausted, and after 1960 coal will only be got from open-cast mines. Sokolov coal is mainly used as fuel for Czechoslovak power production.

Production in Slovakia is still in its initial stage and by 1960 the output of brown coal and lignite is expected to reach just under 3,000,000 tons.

Coal Industry after 1960

The coal industry is planned to develop at an even greater rate after 1960, when the second Five-Year Plan ends, with an output of hard and brown coal exceeding 100,000,000 tons. In the Ostrava-Karvina region hard-coal output will reach over 32,000,000 tons in 1970.

The ultimate output of the whole country is expected to be 38,000,000 tons of hard coal and close on 100,000,000 tons of brown coal and lignite.

Hard-coal Mining: Methods of Working

The geological conditions in the Ostrava coalfield are similar in many respects to those in Britain, the main difference being the greater thickness of coal-bearing measures and the greater number of seams. In the Ostrava-Karvina region there is over 500 ft. of coal in seams varying in thickness from 12 in. to 65 ft. in a strata thickness of 4,370 yd. The measures are predominantly flat, but owing to major dislocations highly-inclined seams are worked in parts of the basin. In the two mines where underground visits were made, the gradients varied from 7 to 8 deg. at Czechoslovak Army Mine (CSA) and 10 to 12 deg. at Hlubina, although in part of the field worked by the latter the gradient rises to 60 deg. The roof conditions seen would be considered normal in this country, but the floor somewhat stronger. The deepest mine being worked is 3,600 ft., but the majority are of more moderate depth, being 1,300 to 1,600 ft.

Colliery output in the Ostrava coalfield varies from 1,000 to 12,000 tons per day, and the trend is towards the combined mine of large size. The seams being worked generally vary from 24 in. to about 10 ft. in thickness, although at the new sinking—Sucha Stonava—which was visited, the variation is from 27½ in. to 26 ft. The two collieries visited were described as being gassy

and at Hlubina an emission of 560 cu. ft. per ton was quoted.

Collieries are developed on the horizon mining principle, the distance between horizons depending upon the gradient of the seams and their distribution in the strata. The advantages of working the seams in descending order are fully appreciated, and the layout of workings is designed so as to permit this system wherever possible. The predominant method of working is by longwall faces and Czechoslovakian mining engineers favour the retreating system.

Interest in British Developments

Faces in the thinner seams are worked by means of bottom-loading belts and in others by armoured conveyors, and both timber and steel supports are used. Of the faces visited, timber was in use in one case, and friction props with link bars on two. The friction props were largely of Czechoslovakian origin, but some German and Russian examples were seen, and the delegation was told that Dowty "Princess" hydraulic props, manufactured in France, were also being used. The Czechoslovakian officials expressed great interest in British developments in self-advancing-supports installations: although none has yet been installed, it was also understood that it is their intention to use this form of support.

Full caving of wastes is normal practice, although pneumatic stowing is used where surface considerations demand it. It is, for example, used as required at the Hlubina mine, which works extensively under property in Ostrava. But for major structures pillars of support are left, and for ordinary property the damage arising from full extraction is small, owing to the thin seam sections. Stowing was not being carried out at the time of the visit to this mine.

The gate roads seen were supported by means of yielding arch girders similar to the TH or Glockenprofil sections, and little damage to the roads was seen in advance of the retreating faces. On the main roadways, steel arches and also concrete block linings were seen, and the standard of both gates and main roads was good.

Tunnelling follows similar practice to that in British mines. At the CSA mine 20 tunnels were being driven at the time of the visit—using millisecond delay detonators, with shovel loaders delivering to belt conveyors. The daily advance of each tunnel was around 13 ft. and the total drivage for the mine was 260 to 295 ft. per day.

The benefits of concentration of working are fully appreciated; at the CSA mine, which produces 11,000 tons per day, 10 seams are being worked, but plans are in hand to bring about a reduction in that number. This mine is over 100 years old, and 40 seams have already been exploited. Collieries do not normally close for an annual holiday, but work six days a week continuously, the miners taking holidays in rotation.

General research into methods of mechanization and development of new machines is in the hands of the Mechanization Institute, which has headquarters in Prague with a staff of 550 people. In the Ostrava coalfield, the main types of machine in use are the Donbas combine of Russian origin, the Anderton shearer of British and German manufacture, coal ploughs, and a Czechoslovakian development of the scraper principle known as the Kuchegda scraper. The Anderton shearers and ploughs are now being built in the Ostroj machinery works. The shearer and the plough appeared to be the most favoured types of machine.

The Donbas combine was seen in operation at the CSA mine (where 35 per cent. of the output is produced by mechanized means) on a retreating face which was working out a triangular area of coal and shortening at each turnover. At the time of the visit the face was 250 ft. long, and two cuts were being taken each day of three shifts in an 8-ft. seam; this gave an output of 330 tons per day at approximately 6 tons per face manshift. Wooden props and bars were used and the coal was delivered by the combine on to an armoured conveyor and in turn to a troughed gate belt. A pneumatic pick was maintained along with the machine in order to bring down top coal and to assist in breaking up lumps.

Also at CSA an Anderton shearer of Eickhoff manufacture was seen working on a retreating face 540 ft. long in a seam 4 ft. thick. A triple-chain armoured conveyor was used, and the face was supported on a saw-tooth system by link bars and friction-type yielding props which, to prevent floor penetration, were set on large wooden soles. The face was worked on three shifts per day, yielding 550 tons with 54 men employed. The machine was equipped with chain haulage instead of the more customary rope; this method is preferred by Czechoslovakian engineers and will be employed in all machines produced in the future. The conveyor was moved over by compressed-air pushers and the impression gained was of an extremely well laid-out and worked producing unit.

Plough Installation at Hlubina

One plough installation was seen at Hlubina on a retreating face 525 ft. long and 24 in. thick. The face was supported by friction props and link bars under a roof which tended to fall as following dirt. The floor was hard and the coal ploughed so well that the face was turning over 9.8 ft. a day on two shifts. In order to avoid congestion at the main gate end, a short compressed-air-driven shaker conveyor was installed to deliver from the face conveyor to the gate belt. The compressed-air rams used for pushing the conveyor and plough into the face were oval in section, their overall height being about 6 in. so as to form the least possible obstruction to men travelling the face in a thin seam. This type of ram—made of light alloy—was seen in production in the machinery works at Ostroj. Apart from the compressed-air shaker and the rams, all the machines seen at work at the coal face were electrically

driven. The yield from the face was 460 tons per day at approximately 5 tons per faceworker.

Czechoslovakian engineeers, while pleased with the shearer for use in the seams of medium thickness, are not yet satisfied that there is a suitable machine available for mechanized production in the thicker seams of 8 to 9 ft.

There was no opportunity to see the Kuchegda scraper in use, although from photographs seen of the machine it would appear to be similar to the German scraper boxes, but guided by ropes or chains instead of by fixed channel guides. Experiments are being carried out with hydraulic mining, but no examples were seen, and the impression gained was that there is much work yet to be done before it can be considered a satisfactory method of production.

Haulage and Winding

The general method of transport from the coal face is by means of troughed gate conveyors delivering either direct to loading points or to staple shafts equipped with spiral chutes delivering to the main horizon haulage. Locomotive haulage is employed for the main transport. At the CSA mine compressed-air locomotives were in use throughout, owing to the gassy nature of the mine. Other types of locomotive are in use in the coalfields, *e.g.*, at Hlubina, diesel locomotives were seen. At the CSA mine, which has been reconstructed, mine cars of 1½ tons capacity were in use.

Winding at the CSA mine was by means of twin, tower-mounted, Koepe winders each of 3,600 h.p., raising coal from one shaft in the eighth horizon at a depth of 1,440 ft. Cage winding was in use, the cages having four decks each holding two cars. The winding engines were supplied by Skoda, of Plzen.

The Hlubina mine has not yet been reconstructed, and the winding arrangements there consisted of four cages running in the one shaft with one electrical and one steam winder operating from different levels. At the Sucha Stonava mine, which is a new sinking, ground-mounted winding engines are to be installed, with skips winding coal from a depth of 1,845 ft. The coal-winding shafts seen were equipped with tilting platforms and other modern car-handling equipment.

The output of the Ostrava coalfield—planned at 22,890,000 tons in 1959, is to rise to 30,000,000 tons in 1965. This increase in output is to come from reconstruction of existing mines and from five new pits, of which two are already under construction. Big exploratory boring programmes are in progress in the Ostrava region, and a new rich coalfield has been discovered where future mines will be opened. During the last 10 years there has been a big reorganization programme as well as a scheme for sinking new mines.

Of the existing collieries 80 per cent. are undergoing reconstruction at the present time and the planning and organization of this work is considered to be of greatest importance.

The delegation was impressed with the work being carried out at the Sucha Stonava new construction. This colliery is to commence winding coal in 1961 to reach full output of 5,000 tons per day in 1963. There are two shafts of 24½ ft. dia. and on the border of the colliery take; there will be a third shaft for ventilation purposes. The winding level is to be at a depth of 1,845 ft.; one of the shafts was, at the time of the visit, at that level and the other at a depth of 1,510 ft.

Shaft sinking, which commenced in October, 1957, has proved very difficult at this mine, since high pressures of methane were encountered for a distance of 100 ft. between 1,115 and 1,215 ft. in depth. The quantity of methane given off was as high as 700,000 cub. ft. per day, and brick coffering had to be adopted in order to continue the sinking through this area. Temporary winders equipped with flat ropes were used in the sinking, and a cactus grab was provided for mucking. The shaft is being lined with reinforced concrete tubbing, and the average speed of sinking has been 125 ft. per month, with a maximum of 330 ft. of finished work.

The seams range from 27 in. to 26 ft. in thickness, but the first one to be exploited will be 6 ft. thick. The preliminary development of the seam is being carried out from a neighbouring colliery, so that by the time the shafts and other equipment are able to take output much of the underground development work will have been done.

There was an interesting form of construction of the surface buildings of the colliery, in which precast concrete frames are erected to provide the main framework for the building, instead of the more conventional "cast-in-situ" stanchions and beams, the report states. The frames were cast on the building site in formers laid out on the ground. The panelling of this building consisted of either precast concrete slabs, where there were doors or windows to be accommodated, or pre-erected brickwork panels which were built on the ground and then hoisted into position.

Reconstruction of Century-old Mine

The CSA mine is an example of reconstruction of an existing mine over 100 years old. It illustrates the trend towards larger units and combined mines which is favoured by the Czechoslovakian engineers. There are four mines involved which, prior to the reconstruction, were producing 4,000 tons per day with an underground output per manshift of 1.14 tons. The reconstruction had as its object the joining of the four together in one combined mine, with output concentrated on the eigth horizon and with one central shaft winding 11,000 to 12,000 tons per day. While the whole of the reconstruction has not yet been completed (some of the surface buildings have yet to be dismantled or replaced), the mine is achieving an output of 11,000 tons per day at 3 tons per manshift underground. At this mine, all persons going underground, whether employees or visitors, are issued with self-rescue equipment.

The delegation visited the mine Gottwald in the Kladno hard-coal region to study developments with various types of spraying and injection as a

protection against fire and, by excluding air, as a precaution against spontaneous combustion. An explanation was given of the use of a mixture of calcium chloride and clay in suspension which is injected into coal or associated strata to exclude air and so prevent heatings. The hygroscopic nature of the chloride keeps the mixture plastic and lowers the temperature and humidity. Pressures up to 220 lb./sq. in. (15 atmospheres) are used for infusion, giving infusion quantities of up to 4,400 lb. per hr. Holes are bored to a depth of 6½ to 10 ft. per infusion and tubes similar to those used in this country for water infusion are used. The system has been put to practical use and has been successful for some three years in a mine where, previously, heatings regularly occurred.

For fire-proofing strata at loader and transfer points and other vulnerable positions a mixture of sodium silicate and clay is used for spraying.

In circumstances where it is necessary to exclude air—for example, at temporary stoppings—a system has been developed of spraying with latex (neoprene) together with the admixture of a 1 to 2 per cent. solution of hydrochloric acid, as a coagulant, and a 5 to 10 per cent. solution of calcium chloride. With this emulsion, a quickly-prepared air seal can be made by spraying the mixture on to metallic gauze. Such a seal can withstand an air pressure of about 4 in. of water gauge. Similarly, strata, brickwork, wood, and steel can be coated with this material. It may also be used for sealing shaft linings. The cost of the treatment was stated to be 7s. 6d. to 9s. per sq. m.

Research work has just been completed on the use of bitumen as a spray. This allows a coating of bitumen to be given without the use of heat. Such a coating is often necessary to achieve water-tightness in a number of operations. The delegation was not told the nature of the emulsifying reagents and coagulator used with the bitumen since patent rights were pending. There were, however, three reagents employed. In a few weeks' time this bitumen spraying was to be used in conjunction with the deepening of a shaft in the Ostrava region. It was known that the strata are lightly water-bearing, but the water contains sulphates which would attack the proposed concrete lining. It is intended, therefore, to spray the strata with the bitumen emulsion and thus to provide protection for the concrete lining.

This new process is likely to be of particular interest to the British industry in view of the difficulties already experienced with sulphate attack of concrete shaft linings, the delegation notes.

"Lingua" Despatcher System

Every deep mine in Czechoslovakia is equipped with a "Lingua" despatcher system for controlling the main underground and surface operations. The system in operation at the Hlubina mine in Ostrava was closely studied and can be briefly described as follows:—

(1) A central control room is housed in the surface offices in charge of the controller and an assistant. The service is in operation 24 hr. a day.

(2) Every large face, loading point, main belt conveyor, main haulage, and pit bottom is connected to the circuit of a 14 double-line shaft cable and sends signals to a visual control board in a surface control room. The system operates on 24 volt d.c. and information in respect of each point is "scrambled." A reverse transmitter and loudspeaker system is included for audible speech.

(3) The system is connected to surface railways, dirt disposal points, and to the crushing plant at Hlubina where underground stowing material is prepared for a number of pits.

(4) All points included in the "Lingua" system also have direct telephone lines connected to the control room. Thus, should any fault develop within the "Lingua" installation, operations revert to telephone communications.

(5) The cost of the "Lingua" system is between £40,000 and £50,000 for the complete installation.

Smoke Detector for the Mines

AN electronic device which can detect smoke in underground colliery tunnels and give immediate warning to any chosen point—possibly even to the colliery manager's office—has been developed by Londex, Limited, London, S.E.20, from an idea by Mr. W. A. Wood, safety engineer, East Midlands Divisional Coal Board. The device involves the use of alpha rays from a radioactive source carried in a small container about 15 in. high which can be suspended from the roof of a tunnel underground or placed at any other strategic point. When smoke enters the instrument, chemical action takes place which results in an electrical connection being made. Thus, any kind of alarm system can be set in motion.

The principle of the system has been known for some time, but hitherto it has not been possible to devise a system of making the apparatus intrinsically safe.

It is now possible to use the detector on an electric supply of 15 V instead of the 240 V which is usual on the surface.

This is the first detector of its kind for use in the pits. Mr. Wood believes it will be relatively cheap, possibly about £50. "Most fire-warning systems depend on heat for their operation, but, as there is usually smoke before fire, this detector will give earlier warning than present devices," he says. Mr. Wood will experiment further with the prototype in a surface gallery at Ollerton Colliery (Notts) before it is put to general use. A puff of smoke (say, from a cigarette) is sufficient to start the alarm.

SCANDINAVIA'S LARGEST PLANT for the production of ferro-alloys for use in the steel industry, AB Ferrolegeringer, Trollhättan, west Sweden, has completed and put into operation a new works for producing ferro-chromium; it will double the output, to 20,000 tons annually, this year.

Papers set at

COLLIERY MANAGERS' EXAMINATIONS

TEXT has been published of the papers set at the examinations held under the Mines and Quarries Act, 1954, by the Mining Qualifications Board on May 17, 18, and 19. The questions for the first-class colliery managers' certificate are given below. Maximum number of marks given for each question was 20, and for each paper, five questions only were to be answered.

The time allowed for each paper was 3 hr., with the exception of that on mining legislation, for which 2½ hr. was allowed.

Winning and Working

(1) A coal seam 3 ft. 6 in. thick is to be worked by a mechanized mining system in a colliery winding coal on two shifts. The daily output required is 2,000 tons. Select one method of power loading and, assuming that mining conditions are reasonably good, estimate the number of faces required, stating the assumptions on which your estimate is based. Sketch and describe a suitable layout, explaining clearly the method and phasing of development and showing the system of transport of coal and materials.

(2) Describe how the operations of loading the debris, winding it to the surface and disposing of it may all be arranged so as to ensure the minimum amount of delay in shaft sinking. Illustrate your answer with diagrams.

(3) A 14-ft. by 10-ft. cross-measure drift has to be driven on a gradient of 1 in 5 dipping for a distance of 400 yd. No dirt can be wound out of the pit on the main filling shift, but there is winding capacity available on the other two shifts. Describe the organization of the work and the equipment you would use in order to complete the work as economically as possible.

(4) Sketch and describe the probable pressure distribution around a longwall face and explain how the position of the abutment loads may vary according to the system and efficiency of the support in use in the waste.

(5) Enumerate the factors which may affect the dirt content of run-of-mine coal. What steps may be taken underground to reduce the proportion of dirt?

(6) A valuable house coal seam 2 ft. 10 in. thick is being worked at a colliery. Describe in detail the method of work you would suggest and all the steps that should be taken to see that as much large coal as possible is produced.

(7) Enumerate the merits and limitations of the horizon system of mining and discuss the factors which determine the distance between horizons.

(8) Describe with sketches the layout and system of work you would propose for working a seam of coal 5 ft. 9 in. thick at a depth of 200 yd. below an industrial housing estate.

Theory and Practice of Ventilation

(1) The surface fan at a mine is situated directly over the upcast shaft and is exhausting a quantity of 325,000 cub. ft. of air/min. A survey revealed that a quantity of 75,000 cub. ft./min. was entering the fan as leakage through the airlock. Measures taken to reduce this leakage have resulted in an increase in flow from the shaft of 15,000 cub. ft./min. Using the graph (Fig. 1) which shows the fan characteristics, find the following results under the new conditions:—

(*a*) the water gauge at the fan,

(*b*) the reduction in leakage at the airlock, and

(*c*) the change in the requirements of power input to the fan.

(2) State the factors to be taken into account when determining the quantity of air required on a longwall face in a mine.

(3) An arched cross-measure drift 11 ft. high is to be driven through strata which is known to contain coal seams and which are expected to be gassy. It is necessary to provide means for examining the roof of the tunnel for gas layers. Describe and illustrate the equipment to be used for this purpose.

(4) The upcast and downcast shafts at a mine are 900 yd. deep and are similar in dimensions, nature of lining, and equipment. The downcast is used for winding from the lower level, and the

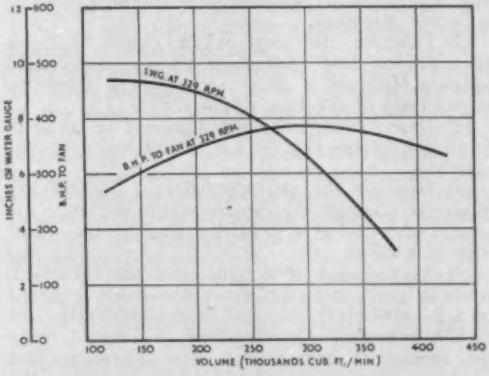


FIG. 1.

upcast for winding from an intermediate level 100 yd. deep. The determinations shown in Table 1 were recorded.

TABLE 1.

Quantity in the downcast in cub. ft./min.	Above the 100-yd. level.	Below the 100-yd. level.	
	200,000	100,000	
Water gauge through separation doors (in.)	At surface.	At 100-yd. level.	At 900-yd. level.
	5.0	4.95	5.35

Determine:—(*a*) The resistance of the shafts in Atkinsons per 100 yd., and (*b*) the pressure due to natural ventilation at the lower level.

(5) Illustrate and describe the items of equipment used for connecting a borehole to the gas main in the cross-measure borehole system of methane drainage. State the purpose of each item.

(6) Illustrate the pressures associated with a ventilation system when it is operated by:—(*a*) A suction fan, and (*b*) a blowing fan. Explain how the resistance of the system is measured in each case.

(7) Describe the method of carrying out a hygrometric survey underground, giving details of the instruments to be used, the information to be obtained, and the method of presenting the results. What would be the purpose of such a survey?

(8) Name the items to be considered in planning the ventilation of a new mine. Explain in detail how to estimate the air quantities and the pressures required to be generated by the main fan.

Explosions, Underground Fires, and Inundations

(1) Spontaneous combustion has been detected in its early stages in the waste of a single unit advancing conveyor face. What steps should be taken in an endeavour to bring conditions back to normal? If it became necessary eventually to seal off the district, discuss the selection of suitable sites for stoppings.

(2) Describe the steps which could be taken to minimize dust production on a power-loaded longwall face in a dusty seam where shotfiring is practised in the face rippings.

(3) Describe the steps which should be taken to minimize the fire risk on a roadway belt conveyor system.

(4) Describe the characteristics of colliery explosions. Discuss the factors which influence the spread of a coal dust explosion through the workings of a mine.

(5) As manager of a mine, you are informed, while at home, that a serious explosion has occurred on a double-unit mechanized face; considerable loss of life is feared. Describe how you would bring the emergency organization into operation, and what rescue work you would attempt pending the arrival of rescue brigades and rescue apparatus.

(6) Discuss possible causes of firedamp layering in roadways, and explain how such layering may be detected. State what steps may be taken to minimize the possibility of firedamp layering in the roadways of longwall advancing workings.

(7) Describe, with the aid of a plan, how you would plan the extraction of an area of coal lying to the dip of old workings in an adjoining abandoned mine, with a view to the safe working of the maximum tonnage.

(8) A belt-driven booster fan has been installed underground. What precautions should be taken to prevent dangers arising therefrom?

Machinery

(1) A shaft 600 ft. deep and 16 ft. dia. is to be enlarged to accommodate two cages each 13 ft. long by 6 ft. wide; rope guides are to be used. Show by a dimensioned diagram, the spacing of the cages, the arrangement of the guides, and the size of the shaft after enlargement. Show by a sketch a method of supporting the guides at the surface.

(2) Sketch and describe a loading point where 1,000 tons per shift is delivered from a belt conveyor to mine cars of 4 tons capacity. The cars are run in trains of 40 by diesel locomotives. Minimum manpower is important.

(3) An endless under-rope haulage is to be installed to deliver 200 tubs of 1 ton capacity/hr. up a road 2 miles long, where the gradient is 1 in 8 against the load. Show by a sketch where you would place the haulage and give reasons for your choice. Also show the arrangements to be made for:—(*a*) Maintaining rope tension on the driving wheel, and (*b*) for splicing the rope.

(4) Describe with the aid of a sketch, a high-pressure pump suitable for deep-hole water infusion at the coal face, the reciprocating motion of the pump being obtained by an oil hydraulic system.

(5) An electrical motor driving a turbine pump is required to run for 8 hr. each day. The normal load is 200 b.h.p. The motor is connected to an a.c. three-phase system. If the power factor is 0.9 lagging and the motor efficiency 90 per cent., calculate:—(*a*) the electrical horsepower taken by the motor; (*b*) the power demand in kW/hr.; (*c*) the input from the source of supply in kVA, and (*d*) the cost of electrical energy per day at 1.75d./kW hr.

(6) An underground road junction is to be lit by five 60-watt 110-V lamps. The supply is from a single-phase transformer at a sub-station 300 yd. away. The resistance of each core of the supply cable is 3 ohms/1,000 yd. What must be the voltage at the low-tension terminals of the transformer to give full voltage at the lamps?

(7) Compare and contrast a.c. and d.c. motors as the drive for tower-mounted, Koepe or multi-rope friction winders with particular reference (*a*) to the method of transmission of power to the friction wheel or drum, and (*b*) to the method of speed control.

(8) Distinguish between the methods adopted for

controlling arc-extinction in mining switchgear for a 440-V. and a 33-kV supply. Give suitable breaking capacity ratings for each type.

Surveying, Levelling, and Drawing

(1) Fig. 2 shows surface contours and depths in feet to the top of a seam, 5 ft. thick, in five boreholes. From the information given on the plan draw thereon:—(*i*) contours of the floor of the seam at 10-ft vertical intervals in multiples of 10 ft., and (*ii*) the direction and rate of full dip of the seam.

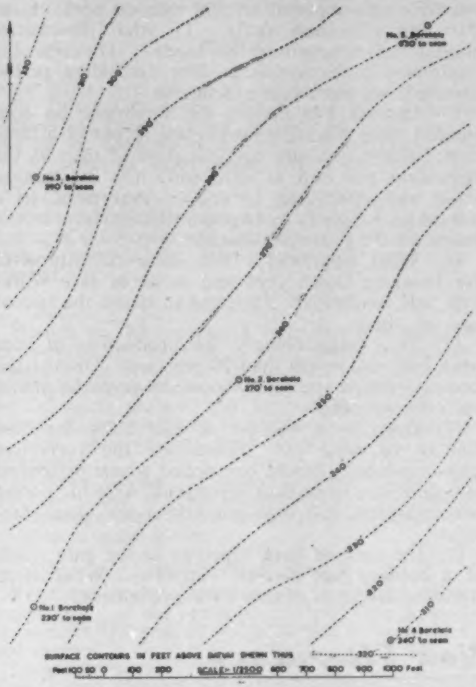


FIG. 2.

(2) The co-ordinates of five points, A, B, C, D, and E, which form a closed area, are as shown in Table 2.

TABLE 2.

Point.	Departure (ft.).	Latitude (ft.).
A	E. 90	N. 300
B	W.100	N.90
C	E. 150	S. 410
D	W. 520	S. 250
E	W. 355	N. 575

Plot the position of each point to the scale of 1 in. = 100 ft. and, by calculation, determine the area of the enclosure in acres, roods, and poles.

(3) Table 3 shows the notes of a traverse survey between stations A and F in a mine which are to be connected by a cross-measures drift.

TABLE 3.

Line.	Azimuth.	Distance (ft.).	Inclination.
AB	89 deg. 54 min.	350	—
BC	150 ,, 12 ,,	190	—
CD	180 ,, 00 ,,	600	—
DE	140 ,, 18 ,,	155	28 deg. rising
EF	228 ,, 36 ,,	800	12 deg. falling

Calculate the bearing, inclined length and gradient of the drift AF.

(4) Table 4 is the record of a dumpy levelling taken along part of an underground roadway. The staff heights enclosed in brackets, thus, (4.34), were taken with the staff inverted, with its base on the roof of the roadway.

TABLE 4.

Back sight	Inter-sight	Fore sight	Rise Fall	Levels reduced to a datum 10,000 ft. below O.D.	Distance in ft. from A	Remarks
5.61				9,654.00	0	At A
	3.21				20	
	(4.34)				20	
	4.12				50	
	(3.03)				50	
	4.02				100	
	(2.65)				100	
	7.12				150	
	(0.58)				150	
	(0.54)				200	
3.35		6.85			200	
	4.12				250	
	(3.63)				250	
	3.75				300	
	(4.02)				300	
	2.65				350	
	(4.95)				350	
	(1.82)				400	
		5.25			400	At B

Reduce the levels to a datum 10,000 ft. below OD relative to A, which is 9,654 ft. above that datum and plot a section of the roadway on a scale of 1 in. = 40 ft.

(5) Compare the modern theodolite with a miners' dial fitted with open sights and a vernier reading to 1 min. of arc. List, aided by a sketch, the principal features of the theodolite.

(6) Surface and underground surveys at a mine served by two shafts are to be correlated by means of two wires suspended in one of the shafts, which is 16 ft. in diameter and 400 ft. deep. State the preparatory work to be done and the apparatus required and describe the instrumental work necessary in the mine to correlate the surface and underground surveys, employing the method of Weisbach.

(7) The co-ordinates of points B and C in a mine in relation to A are:—

B is 117 ft. south and 276 ft. east of A, and C is 477 ft. south and 452 ft. east of A.

Plot the position of each point on a scale of 1 in. = 100 ft. and, by construction, determine the radius of a circular curve passing through A, B, and C. Thereafter, from measurements taken from the plan, calculate the length of the curve ABC.

(8) A locomotive haulage road is being driven from both ends to meet. The survey to set off the roadway involves a circuit of about 1,500 yd. along undulating roadways, the longest straight stretch being 250 yd. List the equipment required and describe the survey procedure to ensure that the drivages meet correctly.

Mining Legislation

(1) A large fall had occurred and been cleared at the roadhead of a double-unit conveyor face and workmen were busy erecting an umbrella of arches in the cavity formed by the fall, when a large flat stone fell from the roof of the cavity causing an ignition of firedamp. A number of men were severely burnt. Discuss the likely contraventions of the Act and Regulations contributing to this incident.

(2) Describe the arrangements required to be made by the Regulations for cutting off the supply of electricity in case of emergency from all apparatus installed below ground. Also state the restrictions on the use below ground of voltages exceeding 650.

(3) In respect of the use of diesel locomotives below ground, state the precautions laid down in the Locomotive Regulations (*a*) to minimize the risk of fire, and (*b*) to ensure, in general, the proper dilution of noxious gases given off by the locomotives. (Sampling standards need not be quoted in your answer.)

(4) How do the Regulations ensure the maintenance of the lighting performance of safety lamps used at the mine?

(5) Outline the training required to be given to a new adult entrant before he can be employed in both haulage operations and on the face as a conveyor shifter.

(6) A ventilating fan (not being an auxiliary fan) is to be installed inbye underground. State (*a*) the procedure to be followed, and (*b*) the requirements to be observed when it is in use.

(7) What duties are imposed by the Act on owners and managers to seek evidence of the proximity of disused workings and other external dangers to present workings?

(8) You are manager of a mine where it has been decided to introduce infusion blasting. What exemptions would you need to apply for?

Mining Technology

(1) Two shafts, each 18 ft. dia. and 500 yd. deep, are to be deepened to 1,000 yd. Coal is wound from the downcast pit bottom only, on two shifts a day, at 1,500 ton/shift. The shaft equipment and winding engines are identical and the shafts are 50 yd. from each other. State how you consider the deepening operation should be carried out while maintaining the normal output of coal; the measures are dry.

(2) Sketch and describe a support system for a 150-yd. shearer or plough face in a 3-ft. 6-in. seam, using self-advancing hydraulic supports excluding roadheads. The floor is a hard clay and the roof a medium grey shale.

(3) List the merits and demerits of skipwinding and describe, with the aid of sketches where appropriate, recent developments in this form of winding with particular reference to loading arrangements.

(4) A return airway 2,000 yd. long and dipping at 1 in 5 is to be enlarged for use as a manriding road for the transport of 500 men on each of the day and afternoon shifts. To what dimensions should the enlargement be made? Describe the equipment to be installed. The manriding period should be as short as is practicable.

(5) Discuss the factors which should be considered when planning the surface layout of a large new colliery in order that the flow of men at the beginning and end of each shift may be streamlined and simplified to reduce movement to a minimum. Sketch a diagrammatic surface layout based on the principles stated.

(6) What alternatives are there to explosives for breaking down coal and stone in face workings and roadways? Describe in detail the use of one of these.

(7) At a large colliery the production of coal over 2-in. size is less than 20 per cent. Discuss the items to which attention should be given to obtain an improvement.

(8) Describe a method of estimating the dust content of mine air. Enumerate the corrective measures which should be applied where periodical sampling in a stone drift throughout a 24-hr. period has indicated that dust conditions are unsatisfactory.

(9) The cost of back rippings in the gate roads of a colliery has become excessive. What steps could be taken to obtain an improvement?

New Literature

NEW catalogues, booklets, and other publications which have recently been received include those mentioned below.

SAMUEL OSBORN & COMPANY, LIMITED, Clyde Steel Works, Sheffield 3—Revised brochures covering the company's range of milling cutters and reamers are now available.

TUBE INVESTMENTS, LIMITED, The Adelphi, London, W.C.2—A very attractive brochure has been produced by the company for distribution among the visitors to the TI stand at the British Exhibition in New York. "Portrait of a Young Giant" is the title of the section devoted to the story of the growth and development of the group, and it is followed by sections devoted to the various divisions which constitute the existing organization.

STURTEVANT ENGINEERING COMPANY, LIMITED, Southern House, Cannon Street, London, E.C.4—Full details of the company's aero foil bladed BAVA fan are contained in publication No. 2804. The fan is designed for use in air conditioning, general ventilation, and drying plants where high efficiency and quiet operation are desired, while it is also used for boiler draught and general industrial processes where continuous running enables the higher initial cost of this type of fan to be offset against the economy in absorbed power.

IRON AND STEEL TRADE

INDICATED delivery dates for finished steel products must in future be based on a realistic appreciation of the capacities of the plans rather than the urgencies of the steel users' requirements. There was a slight recession in usage in May, but first quarter figures show a 5 per cent. gain on the previous best—the second half of 1957. This confirms the impression that the approximate usage for the year will level off at about 20,000,000 tons.

Pig-iron

The steel industry makes no secret of the fact that more crude steel could be handled at the finishing mills. Blast furnacemen cannot keep pace with the demand and their reactions probably owe their inspiration to the expectation that still heavier requisitions are to come as more steelmaking plant is brought into action.

The ironfoundries are also issuing increased specifications for foundry and forge grades, and current figures of production and consumption probably reflect quite accurately the relative state of supply and demand.

Ferro-alloys

Despite the Whitsun break little change is noted in the demand for most items, with ferro-tungsten continuing to receive rather more attention at present. Both the high and low carbon grades of ferro-chrome are in steady request, and ferro-silicon is well supported. Calcium silicide is fairly active, and there is a good demand for ferro-manganese and silico-manganese.

Moderate support is given to ferro-titanium and there is a fair call on ferro-niobium. The demand for ferro-vanadium is at a steady level, and ferro-molybdenum is quite active.

Semi-finished Steel

Regulated imports, sufficient to cover the greater requirements of the re-rollers, are providing a useful cushion for UK steel to bridge the gap between supply and demand.

Larger tonnages of billets, slabs and other forms of semi-finished material are being consumed, but these are regularly forthcoming to the consumers.

Finished Steel

Apprehensions of a big run on plates are indicated by the stock figures at the end of June, 1959, compared with those of Friday. While the flow of plates to the shipyards has not been arrested, other sales avenues have been developed. Some big bookings have been accepted for the supply of steel pipes abroad. It is believed to be the fact that increases in the volume of orders placed with the engineering industry has stimulated the revival.

In the sheet trade, there are prospects of some relief from the tight squeeze which has overtaken the motor industry. More plant is due to come into operation later in the year and this should enable the makers to deal with some of the backlog.

IT WOULD COST £950,000 to make Aberdeen a smokeless zone, Cllr. Mrs. I. M. Allen told the corporation's health and welfare committee on Tuesday. The committee was divided on the question of instituting a smokeless zone and would need to know the annual expenditure involved in such a scheme.

New Research Data on Cold Steel Extrusion

CONSIDERABLE data is now available from the laboratory on the cold extrusion of steel, says the report of the steering committee of the National Engineering Laboratory of the Department of Scientific and Industrial Research at East Kilbride, Glasgow, published on Wednesday. Basic research in cold extrusion over a number of years "is now reaching the stage at which its value to industry will be so clear that there will be no need to continue public expenditure at the present rate."

The laboratory is now able to give information on the effect of variable processes and pressures required to extrude products in a wide range of low carbon and alloy steels, and data is also available on the flow of metal during extrusion and on the properties of the extruded product.

Production of sparking plug bodies, ball-race housings and other components by extrusion from unheated steel billets has been found to offer the advantages of a high rate of production, good surface finish, and improved mechanical properties.

Research in the machine-tool field, says the report, has shown that inaccuracies can be greatly reduced by using moiré fringe techniques which can be applied to measure the errors in the movement of the machine, and to control the movements.

A radial cylinder hydrostatic transmission has been developed for use in machine tools. It is said to be cheap to make, and the usual pistons have been replaced by reciprocating balls. A commercial unit with a maximum power of 60 h.p. has been designed for mass production, and a vertical boring mill fitted with this design is to be shown at the International Machine Tool Exhibition which opens in London shortly.

Chairman of the steering committee, vice-admiral Sir Frank Mason, stresses in the report that research facilities at the laboratory will not be fully effective until industrial firms make more use of them. The laboratory was open to visitors on Wednesday and yesterday (Thursday), when 100 research items were on show.

Dutch Scrap Steel Cartel Rejected by ECSC

REQUEST for a cartel between nine Dutch scrap steel dealers, first made in 1954, has been rejected by the High Authority of the European Coal and Steel Community. It was considered that the intentions of the proposed cartel as to the common buying and selling of steel scrap, sales conditions, and profit-sharing were contrary to the ECSC Charter.

The cartel would have handled 91.5 per cent. of all scrap sales to the Dutch iron and steel industry, and undertaken 80 per cent. of all Dutch scrap dealings.

Minister Sees SCOW's £52,000,000 Project

WITH the commissioning of the Benson "once through" boiler, together with a back-pressure turbo alternator, at the Margam works of the Steel Company of Wales, Limited, the latest £52,000,000 development project for the blast furnaces, coke ovens, and steelmaking plant at the Margam and Abbey works has been completed. Mr. Richard Wood, the Minister of Power, on Monday inspected the installation which brings the capital investment at the works to a total of more than £200,000,000.

On Tuesday the Minister continued his programme of becoming acquainted with the British coalfields by visiting Brynlliw Colliery and Cwm Colliery, near Pontypridd and was entertained at dinner by members of the South-Western Divisional Coal Board.

Yesterday was another "steel" day. Mr. Wood saw Uskmouth "B" power station and then went on to inspect the site of the Spencer Steelworks of Richard Thomas & Baldwins, Limited, at Llanwern, Newport.

ASSOCIATED PORTLAND CEMENT TO EXPAND

ANOTHER record at home in 1960 is expected by the Associated Portland Cement Manufacturers, Limited, and the chairman, Mr. J. A. E. Reiss, states that deliveries might well be between 8 and 10 per cent. up on 1959. So that the company may take its share of the world-wide rise in cement production, the chairman outlined expansion schemes, which would take three years to complete, to increase its capacity by 1,000,000 tons a year. This would be the largest home building programme the company had undertaken.

Record sales of 2,262,000 tons were made in 1959 by the oversea companies in the group. Clinker production by the home group was 2 per cent. higher than in 1958 and deliveries of Portland cement in the UK were up by about 6 per cent., while oversea deliveries dropped by about 3 per cent. The net profit of the parent group was £2,225,963 (£1,600,810), and the dividend is increased from the equivalent of 9.6 to 11 per cent.

British Team of Directors on Russian Fact-Finding Mission

PROBLEMS of Soviet industrial management are to studied by a goodwill and fact-finding mission to be sent to Russia by the Institute of Directors. It will leave London for Moscow on Monday, and return on July 2. A similar mission from Russia will visit Britain in the autumn.

The mission was not a trade delegation in search of orders, said Sir Richard Powell, director-general of the institute, but rather an attempt to get an overall picture of top Russian management policy in industry and commerce.

The mission, headed by Mr. H. C. Drayton, will include Sir George Binney, a director of the United Steel Companies, Limited, Sir Percy Lister, chairman of R. A. Lister & Company, Limited, and Mr. J. B. Scott, sales director of Crompton Parkinson, Limited.

The invitation was from the State Scientific and Technical Committee of the USSR. On its return, the mission will publish a detailed report on the visit.

Increases of Capital

SPENCER GEARS, LIMITED, Leicester, increased by £50,000, in 1s. ordinary shares, beyond the registered capital of £50,000.

JENNER ENGINEERING, LIMITED, Hayes (Middx), increased by £1,000, in £1 ordinary shares, beyond the registered capital of £1,000.

S.S.S. GEARS, LIMITED, Isleworth (Middx), increased by £20,000, in £1 ordinary shares, beyond the registered capital of £20,000.

WILKINSON SWORD, LIMITED, London, S.W.1, increased by £300,000, in £1 ordinary shares, beyond the registered capital of £200,000.

CHADBROOK ENGINEERING COMPANY, LIMITED, Luton, increased by £19,900, in £1 ordinary shares, beyond the registered capital of £100.

FAFNIR BEARING COMPANY, LIMITED, Wolverhampton, increased by £349,900, in £1 ordinary shares, beyond the registered capital of £100.

RICHARD SAWDON (ENGINEERS), LIMITED, London, W.1, increased by £9,000, in £1 ordinary shares, beyond the registered capital of £1,000.

HASSIA PACKAGING MACHINES, LIMITED, London, W.C.1, increased by £4,000, in £1 ordinary shares, beyond the registered capital of £1,000.

HENRY TURNER MACHINE TOOLS, LIMITED, London, S.W.17, increased by £9,000, in £1 ordinary shares, beyond the registered capital of £1,000.

MINWORTH METALS, LIMITED, Sutton Coldfield (Warwick), increased by £50,000, in 1s. ordinary shares, beyond the registered capital of £250,000.

MINING & METALLURGICAL AGENCY, LIMITED, London, E.C.2, increased by £40,000, in £1 ordinary shares, beyond the registered capital of £40,000.

A. E. CHALLENGER & COMPANY, LIMITED, engineers, etc., of York, increased by £7,500, in £1 unclassified shares, beyond the registered capital of £2,500.

D. J. PERCIVAL, LIMITED, wire drawers, etc., of West Bromwich, increased by £36,000, in £1 ordinary shares, beyond the registered capital of £18,000.

G. P. WINCOTT, LIMITED, engineers, furnace builders, etc., of Sheffield, increased by £60,000, in £1 ordinary shares, beyond the registered capital of £40,000.

MATTHEWS & YATES, LIMITED, engineers, etc., of Swinton, near Manchester, increased by £60,000, in £1 ordinary shares, beyond the registered capital of £120,000.

RYECROFT ENGINEERING COMPANY, LIMITED, Ashton-under-Lyne (Lancs), increased by £11,0000, in £1 ordinary shares, beyond the registered capital of £4,000.

PETER THOMASON, LIMITED, iron and steel stockholders, etc., of Manchester, increased by £3,000, in £1 ordinary shares, beyond the registered capital of £3,000.

W. J. KENYON & COMPANY, LIMITED, sheet metal workers, etc., of Bolton, increased by £47,000, in £1 ordinary shares, beyond the registered capital of £3,000.

ALGRAPHY, LIMITED, manufacturers of printing machinery, etc., of London, S.E.15, increased by £30,000, in 5s. ordinary shares, beyond the registered capital of £30,000.

HARRIS & BAILEY, LIMITED, coal, coke and building materials merchants, etc., of Croydon, increased by £5,000, in £1 shares, beyond the registered capital of £15,000.

WEST RIDING ENGINEERS, LIMITED, Baildon (Yorks), increased by £17,500, in 9,500 preference and 8,000 ordinary shares of £1 each, beyond the registered capital of £7,500.

SHARP & COMPANY, LIMITED, general and manufacturing engineers, etc., of Bromley (Kent), increased by £40,000, in £1 shares, beyond the registered capital of £10,000.

ANGEL SON & GRAY, LIMITED, iron merchants, ironmongers, etc., of Guildford (Surrey), increased by £40,000, in £1 ordinary shares, beyond the registered capital of £30,000.

STEEL NUT & JOSEPH HAMPTON, LIMITED, nut and bolt manufacturers, etc., of Wednesbury, increased by £200,000, in £1 ordinary shares, beyond the registered capital of £200,000.

GEORGE HUGHES (CORO), LIMITED, engineers, founders, etc., of Birmingham, increased by £2,000, in £1 5½ per cent. cumulative preference shares, beyond the registered capital of £4,000.

HENRY KELLAND & COMPANY, LIMITED, agricultural machinery manufacturers, etc., of Bridgwater (Somerset), increased by £30,000, in £1 ordinary shares, beyond the registered capital of £35,000.

HERBERT MORRIS, LIMITED, engineers and makers of lifting and other machinery, of Loughborough (Leics), increased by £1,000,000, in 10s. ordinary shares, beyond the registered capital of £1,200,000.

FOUNDRY & METALLURGICAL EQUIPMENT COMPANY, LIMITED (formerly Efco Engineering Company, Limited), Weybridge (Surrey), increased by £15,900, in £1 ordinary shares, beyond the registered capital of £100.

BRITISH ROLLMAKERS CORPORATION, LIMITED, Birmingham, increased by £690,847, in 626,987 ordinary and 63,860 5½ per cent. cumulative preference shares of £1 each, beyond the registered capital of £2,500,000.

NORTH EASTERN IRON REFINING COMPANY, LIMITED, Stockton-on-Tees, increased by £32,368, in 12,368 ordinary and 20,000 10 per cent. redeemable cumulative preference shares of £1 each, beyond the registered capital of £12,386.

Company News

Capital for Glacier Metal

DEBENTURE AND RIGHTS ISSUE PLAN

DEBENTURE issue and in due time a rights offer of new ordinary shares is being considered by the Glacier Metal Company, Limited, manufacturers of bearings and bearing metals, diecastings, etc., of Alperton (Middx), reports Mr. W. B. D. Brown, chairman. These plans, if put into force, will yield capital to reduce or extinguish the bank overdraft, finance some expected rise in liquid investment, and enable the completion of urgent schemes for expanding production capacity and increasing efficiency.

The group has been short of capital since 1957. During 1959 it was decided that loans should be used to bridge the gap until profits rose to a level permitting a capital increase and further share issue. The group overdraft at February 29, 1960, was £135,743 (nil). Capital expenditure commitments outstanding at June, 1960, stand around £250,000, says Mr. Brown, but there are still many steps the directors cannot yet commit themselves to due to immediate capital shortage.

The group now supplies about 40 per cent. of the British motor industry's requirements for plain bearings and is the major supplier of such bearings to the diesel engine and heavy electrical engineering companies in this country. Turnover for the first quarter of the current year shows a considerable improvement over the same period last year, and barring unforeseen contingencies, profits are expected to be higher.

INTERNATIONAL COMBUSTION AFRICA, LIMITED—An interim dividend of 10 per cent., equivalent to 6d., per share has been declared.

REICHHOLD CHEMICALS, LIMITED—In view of the capital expenditure programme a one-for-four rights issue is to be made. Details will be announced in due course.

ARON ELECTRICITY METERS, LIMITED—The net loss of £17,194 for 1958 has been turned to a net profit of £28,726 for the past year. The dividend is unchanged at 15 per cent.

MIDLAND BRIGHT DRAWN STEEL & ENGINEERING COMPANY, LIMITED—Interim dividend is being raised from the equivalent of 9¼ per cent. to 15 per cent. in respect of the year to October 31, 1960. A total equivalent to 25 per cent. was paid for 1958-59.

SPEAR & JACKSON, LIMITED—Final dividend of 12½ per cent. makes 17½ per cent. for 1959 on capital increased by a two-for-one scrip issue. This represents an effective increase of 5 per cent. over 1958. Group net profit was £210,097 (£149,938), after tax of £159,311 (£120,776).

HAYWARD, TYLER & COMPANY, LIMITED, manufacturers of pumps and other accessories for the nuclear energy industry, of Luton—The company is abandoning its profits bonus system and substituting an overall increase on wages and salaries equivalent to about 3½ per cent.

RALEIGH INDUSTRIES, LIMITED—Valid acceptances of the offer by Tube Investments, Limited, to acquire the whole of the ordinary share capital have been received in respect of 3,422,247—84.42 per cent.—of the ordinary shares. The offer is now unconditional and has been extended to June 30.

MIRRLEES WATSON COMPANY, LIMITED, engineers and iron and non-ferrous founders, of Glasgow—The company suffered a setback in the year ended March 31, 1960, when the net profit contracted to £77,559 from £122,570, after tax of £67,127 (£117,417). The dividend is maintained at 15 per cent.

WALSALL CONDUITS, LIMITED, manufacturers of electrical switchgear and conduits, and malleable and grey iron founders, of West Bromwich (Staffs)—Final dividend of 10 per cent. makes 15 per cent. for 1959 (12.85 per cent. equivalent). Group net profit was £358,707 (£340,711), after tax of £307,340 (£321,750).

GLOVER & MAIN, LIMITED—The share capital of George Glover & Company, Limited, gas meter manufacturers of London, S.W.3, is to be acquired from Radiation, Limited. The purchase price is £30,000 in cash, based upon a valuation of the net assets at the time of the acquisition and includes £20,000 for goodwill.

CRANE, LIMITED, manufacturers of pipe line materials for steam, air, water, oil, and gas, etc., of London, E.C.4—The offer of 48s. 6d. a share for all the 10s. ordinary shares of Lumbys, Limited, manufacturers of boilers and heating apparatus, of Halifax, has been accepted by 91 per cent. of the shareholders and the offer is now unconditional.

K. G. (HOLDINGS), LIMITED—Offer for the issued capital of Modern Engineering Developments, Limited, has received acceptances exceeding 94 per cent. of the ordinary capital and 92 per cent. of the preference capital. The board intends to acquire the remainder of the capital by exercising the provisions of Section 209 of the Companies Act, 1948.

GEORGE SALTER & COMPANY, LIMITED, manufacturers of springs, weighing machines, roller bearings, etc., of West Bromwich—The dividend is increased to 12½ (10) per cent. and a special bicentenary distribution of 6 per cent., tax free, is to be paid in addition. Net profit for the year ended March 31, was £98,142 (£84,455), after tax of £62,366 (£54,818).

THOMAS HARDMAN & SONS, LIMITED, machinery cloth manufacturers, of Bury (Lancs)—Final dividend of 8½ per cent. makes 15 (14) per cent. for the year ended April 2, 1960. A rights issue of 250,000 ordinary 2s. shares on a one-for-four basis at 3s. 9d. a share is proposed and, subject to shareholders' consent, it is proposed to offer up to 50,000 of the new shares to

employees at that price. The authorized capital is to be increased to £300,000 by the creation of 1,000,000 2s. ordinary shares. Net profit rose from £25,712 to £30,003, after tax of £24,884 (£16,675).

CHARRINGTON, GARDNER, LOCKET & COMPANY, LIMITED—Final dividend of 7 per cent. (same) maintains 11 per cent. for the year ended March 31. Group net profits rose to £216,841 from £197,583, after tax of £236,105 (£310,263). A rights issue is to be made, at a price to be announced later, of one 5s. ordinary share for every four 5s. ordinary stock units.

CASTINGS, LIMITED, malleable ironfounders, of Walsall (Staffs)—Total dividend of 15 per cent. for the year ended March 31, 1960, is recommended—2½ per cent. over the rate forecast when the shares were introduced in Birmingham last February. Net profit was £118,425 subject only to tax of £58,612, compared with the estimate that profits would be in excess of £75,000.

BRISTOL TRACTORS, LIMITED—In the field of general engineering, the company has consolidated and enhanced its associations with some of Britain's leading industrial groups, states the chairman, Mr. C. W. Jowett. Net profit for the year ended March 31, 1960, was £20,151 (£15,762) and the dividend is 11 per cent. as forecast. The company was made public in February.

MASSEY-FERGUSON, LIMITED—Consolidated sales for the six months ended April 30 were $221,000,000—a drop of 2 per cent. on the same period of last year. Net income, after taxes, was $7,372,000 compared with $12,606,000 in 1959. The president, Mr. A. A. Thornbrough, states that despite the drop in net income it is hoped in 1960 to equal, or perhaps improve on, 1959 world-wide sales.

BAKER PERKINS, LIMITED—The company has acquired the Granbull Tool Company, Limited, for £85,000, to be satisfied by the issue to the vendors on June 20 of a sufficient number of £1 ordinary shares to yield that amount at the middle Stock Market price immediately before that date. Mr. F. G. Bull will remain managing director of Granbull and Mr. R. H. Wilkins will become chairman.

YORKSHIRE COPPER WORKS (HOLDINGS), LIMITED—Interim dividend on account of the year ending July 31, 1960, is raised from the equivalent of 4 per cent. to 5 per cent. The 1958-59 final payment was 6 per cent. on the present capital as increased by a one-for-two scrip issue in June, 1959. Earlier this year ordinary holders received a 33⅓ per cent. scrip issue in 5 per cent. second preference shares of £1 each.

AUTOMOTIVE PRODUCTS ASSOCIATED, LIMITED, manufacturers of vehicle and aircraft equipment, of Leamington Spa—The company's share in the upward trend in the motor industry resulted in the highest sales turnover in its history. Group net profits increased from £972,793 to £1,157,682 and the dividend is effectively increased from 10 to 12½ per cent. with the proposed one-for-three scrip issue.

JONAS WOODHEAD & SONS, LIMITED, manufacturers of laminated and coil springs, of Leeds.—Dividend of 7½ per cent. is announced for the six months ended March 31, 1960, against 10 per cent. for the previous year. It is proposed to capitalize reserves by a one-for-10 scrip issue to holders registered on July 1. Net profit of £75,886 compares with £78,820 for the previous full year, after tax of £59,800 (£54,400).

THOMAS WRAGG & SONS (SHEFFIELD), LIMITED, makers of refractories, etc., of Loxley, near Sheffield—Arrangements are nearing completion for the marketing of the preference and ordinary shares on the Sheffield Stock Exchange. The company will have an issued capital of 100,000 7 per cent. £1 cumulative preference shares and 1,200,000 5s. ordinary shares. Particulars of the company are due to be published on June 20 and dealings should start three days later.

CHAMBERLAIN & HILL, LIMITED, ironfounders, of Walsall (Staffs)—Although turnover in 1959 increased by some 9 per cent., trading profits remained stationary—a reflection of the way in which costs had gone up and profit margins shrunk, says Sir Frederick Scopes, chairman. The company is seeking new ways to increase production. At present both foundries are working to full capacity, and demand continues to maintain the order-books at a very high level.

GRIFFIN & GEORGE, LIMITED, manufacturers of scientific apparatus, etc., of Wembley (Middx)—The company has bought the whole of the share capital of R. & J. Beck, Limited, optical instrument manufacturers, of London, W.1. The existing board of Mr. C. J. Beck, Mr. S. Borthwick, Mr. G. E. Fowler, and Mr. H. W. Morgan will continue, but with Mr. M. Lyth, Mr. H. C. Mayer, Mr. R. C. Palmer, and Mr. F. A. Renn as additional directors representing Griffin & George.

PRICE-PEARSON REFRACTORIES, LIMITED—The dividend for the year ended March 31 is increased to 25 (22½) per cent. and there is a special tax free capital distribution of 2½ per cent. Group profit was £207,284 (£139,934), before tax of £91,578 (£59,987). An amount of £350,000 has been sanctioned for the construction of a new works and in this connection and for future developments the borrowing powers are to be extended to twice the nominal amount of the authorized capital.

BSA Companies to Act Independently

IT is intended to make all the companies of the BSA Company, Limited, group, function autonomously with their own boards of directors and with the deputy chairman, and chief executive, Mr. Eric Turner, having a seat on the majority of these.

In view of this decision the following additional directorships are announced:—BSA Motor Cycles, Limited, Mr. Eric Turner, Mr. W. L. Rawson, Mr. J. W. Binsted, Mr. A. H. Jones; Triumph Engineering Company, Limited, Mr. Turner; Ariel Motors, Limited, Mr. Turner, Mr. Edward Turner, Mr. R. J. Fearon; Carbodies, Limited, Mr. Eric Turner, Mr. J. E. Rowe, Mr. C. W. F. Parker; Idoson Motor Cylinder Company, Limited, Mr. Eric Turner, Mr. Rowe, Mr. R. F. K. Belchem, Mr. Fearon; Birtley Engineering, Limited, Mr. Eric Turner, Mr. F. Jordison, Mr. A. E. B. Smith; BSA Metal Powders, Limited, Mr. Binsted; Metal & Plastic Components, Limited, Mr. Binsted.

Man and his Job—Results of Recent Studies

RESULTS of recent research into ergonomics—the study of man in relation to his working environment—will be discussed at a conference of the Department of Scientific and Industrial Research in London from September 27 to 29.

Concern of ergonomics is the improvement of industrial efficiency by ensuring that equipment is within the mental and physical capabilities of workers, and deals with such factors as noise, lighting, temperature and the complexity of the job. Speakers at the conference will be from industrial organizations, trade unions, medical services, and academic bodies.

THE COAL TRADE

IN the north the market, even in the domestic sector, would seem to be much more lively than it is in the south and west. The better qualities still sell steadily and although, as was to be expected, the volume of trade has shown the usual seasonal slackening, it is still fairly steady. A strenuous effort is being made to recapture some part of the export market and here again results, though not remarkable, are encouraging.

NORTHUMBERLAND AND DURHAM

The market is moderately active and superior coals are generally sold forward. This position is largely maintained by a consistent coastwise and inland demand. The trend is towards improvement in exports, more especially of coke, but competition for new business is perhaps keener. Apart from existing contracts, this section of the market remains dull.

On the Tyne, where shipments have shown a smaller percentage rise than at Blyth and on the Wear, the outlook is more encouraging in that the river's coal and coke trade is showing greater stability—again partly due to the increase in coke exports. Superior large and graded steams move off well, and iron and steel activity maintains a consistent demand for coking coal and industrial cokes. Gas coal is a moderate trade.

SCOTLAND

Glasgow—Interest in supplies for domestic space-heating purposes is maintained and there is little surplus house coal to offer. A little is going on the ground at the pithead, but only a fraction of the tonnage of a year ago. A very heavy demand persists for the top grades in each group. A modest business is passing in washed doubles for the domestic trade and supplies of these are plentiful. Other alternatives are slow to sell, including manufactured fuels and gas coke. Anthracite stove nuts clear promptly but hard coke nuts are sticking. Demand for anthracite large is falling away as the seasonal requirements of horticultural users diminish, but export business is brisk for all low-volatile duff, and production clears immediately.

Industrial activity continues on a strong note, and consumption is maintained at a high level. This is most marked in the case of the iron and steel trade, and especially on the coke oven side where throughputs are running steadily around 35,000 tons a week. All sized fuel, with the exception of pearls, is moving without too much difficulty. Metallurgical coke is extremely busy, but supplies are adequate, and foundry grades are also a more animated trade.

Fife and Lothians—Trade on the whole tends to be quiet, except for the best house coals in the top groups. Industrial sorts are in adequate supply with pearls particularly plentiful. Export business keeps above last year's level.

NEW BRANCH of the Chase Engineering Company, Limited, opens today (Friday) at 207, Alexandra Road, Palfrey, Walsall.

BRIGHTSIDE ENGINEERING HOLDINGS, LIMITED—Mr. Tom C. Firth has been elected chairman in succession to Mr. Ambrose Firth who has resigned for health reasons.

Coal Chartering

GENERALLY speaking coal markets are quiet and only a moderate volume of tonnage has been fixed from the Hampton Roads area, with some possible falling away in the overall demand for Japanese destinations, but $8.75 is reported for July/August loading.

There is still some enquiry to Brazil and to the Lower Plate, the former reporting 13,000 tons fixed for Rio for July 1/15 at $5.30. Tonnage has also been taken from the Roads to West Italy for June at $4.25 for 12,500 tons, 9,500 tons to the Adriatic for June 1/10 at $5.00, and tonnage is also reported fixed to Sicily for July/August at $4.90.

Handy tonnage has been fixed from Wales to Lisbon for prompt loading at 16s. for 2,600 tons and 17s. 6d. was paid for 3,000 tons middle June to Lisbon or Leixoes.

There is, however, no particular demand from the UK ports, but there is quite a fair interest for coasting sizes for continental discharge from West Coast, and East Coast is still freely quoting to Scandinavian destinations.

Bulk-loading Lorry Demonstrated

DEMONSTRATION of the Charrold bulk-loading lorry recently at the headquarters of the Northern (N&C) Divisional Coal Board, Longbenton, Newcastle-upon-Tyne, was watched by engineers from the Durham and Northern (N&C) divisions, members of planning authorities and local hospital boards, and architects.

Supplied by the firm for a fortnight's tour of the North-eastern coalfields, the lorry can deliver over a wall, through a hatchway, or on to a stack as well as into the usual pavement hole.

The visitors were welcomed by Mr. P. M. Cole, deputy divisional marketing director.

Mine Rescue Team's Efforts Praised

EFFORTS at artificial respiration carried on underground after a miner had been buried in a roof fall were praised by Mr. F. G. Halls, Stoke-on-Trent City coroner, and Mr. W. Simcocks, an official of the NUM, at the inquest at Stoke on Tuesday on Mr. Stanley Forrester (40), who was suffocated in a fall at Florence Colliery on June 9.

Far from assuming that "all was finished," Mr. Simcocks said, rescue workers persevered for an hour with artificial respiration after getting the equipment into an almost inaccessible part of the pit.

The jury returned a verdict of Accidental Death.

Board Changes

TI Directors Join Raleigh Industries

FOLLOWING the declaration by Tube Investments, Limited, that its offer to shareholders of RALEIGH INDUSTRIES, LIMITED, was unconditional, Maj.-Gen. Sir Francis de Guingand and Mr. T. J. Boulstridge have joined the Raleigh board. Sir Francis has for many years been chairman and managing director of Tube Investments' cycle and other interests in South Africa and is a director of TI.

Mr. Boulstridge, also a director of TI, has had wide experience in the cycle industry as managing director of J. A. Phillips & Company, Limited, and has recently joined the board of the British Cycle Corporation, Limited.

CALDERS, LIMITED—Mr. W. J. O. Jenkins has joined the board.

WESTON WORKS (BIRMINGHAM), LIMITED—Mr. D. A. Pearson has retired from the board.

BRITISH ALUMINIUM COMPANY, LIMITED—Mr. Henry F. R. Catherwood is to join the board.

SIR LINDSAY PARKINSON & COMPANY, LIMITED—Mr. F. M. Bennett, Conservative MP for Torquay, has joined the board.

ENGINEERING & LIGHTING EQUIPMENT COMPANY, LIMITED—Mr. F. Webster and Mr. C. G. Maynard have joined the board.

CRANES (DEREHAM), LIMITED—Mr. L. H. Allwood has been appointed chairman following the death of Mr. W. F. Crane last month.

EDMONTON STEEL STRIP, LIMITED—Mr. Charles W. Hayward has been appointed chairman and Mr. A. E. Gilbert has been made managing director.

JURY HOLLOWARE, LIMITED—Mr. R. B. Williams has succeeded Mr. Karl Silk as managing director and Mr. J. C. Bishop succeeds Mr. Williams as secretary.

CATMUR MACHINE TOOL CORPORATION, LIMITED—Mr. Peter S. Catmur is to become managing director in succession to Mr. N. W. S. Catmur who is to retire on July 31.

GEEVOR TIN MINES, LIMITED—Mr. D. H. Batchelor has been appointed manager in place of Mr. J. Herbert Bennetts, who is retiring on June 30. Mr. Bennetts will retain his seat on the board.

HUNTLEY, BOORNE & STEVENS, LIMITED—Mr. L. Victor Smith, deputy chairman and managing director, has relinquished the latter position and is to be succeeded by Mr. M. L. Lindley. He remains deputy chairman.

TUBE INVESTMENTS, LIMITED—Mr. G. H. B. Wilson, chairman and managing director of Raleigh Industries, Limited, has joined the board. This follows the offer by the company for the ordinary share capital of Raleigh which became unconditional at the beginning of the month.

DOWTY HYDRAULIC UNITS, LIMITED—Mr. Lionel Harper has been appointed managing director. Formerly assistant managing director of Massey-Ferguson (Great Britain), Limited, Mr. Harper is a member of the board of governors of the National College of Agricultural Engineering, a member of the Ministry of Agriculture Agricultural Machinery Advisory Committee, and a member of the council of the European Association of Agricultural Machinery Manufacturers. He is also a former president of the Agricultural Engineers' Association and chairman of the Power Farming Conference.

ECSC Steel Output Close to Record

OUTPUT of crude steel (ingots and castings) in the European Coal and Steel Community in May passed the 6,000,000-ton mark for the second time. Provisional figures issued by the Joint Statistics Office of the ECSC show May output at 6,149,000 metric tons, against 5,838,000 tons in April and 4,959,000 tons in May, 1959.

The only other month in which output has exceeded 6,000,000 tons was March this year, when the record total of 6,395,000 tons was achieved. Output was then at a very high level in all ECSC countries.

The May total brought output for the first five months of the year to 30,190,000 metric tons—an increase of 23.5 per cent. over the 24,446,000 tons produced in the same period of 1959. Largest percentage increase—of 30.5 per cent.—was recorded in Italy, and the largest volume increase in West Germany—of 2,997,000 tons, or 27.1 per cent.

Output of pig-iron and ferro-alloys in May was also close to the previous record level, reaching 4,631,000 metric tons, compared with 4,361,000 in April and 3,783,000 in May, 1959. For the five-month period, output totalled 22,391,000 tons—23.1 per cent. more than the 18,189,000 tons produced in the corresponding period last year.

The High Authority has given its decisions (not published) on the investment in an electro blast furnace by the Ilssa Viola concern, Milan, and an electro blast furnace by the Fiat company, Turin; on the setting up of a Möller processing unit, modernization of a blast furnace, installation of oxygen apparatus in a steelworks, and the extension of a broad-band steel unit by the Hoesch-Westfalenhütte concern of West Germany; and on the installation of an extrusion casting unit by the Dillinger Hüttenwerke, of Dillingen, in the Saar.

Political Factors Affected Blackwood, Hodge Sales

REDUCTION of just over 7 per cent. in sales in the year to October 31, 1959, of Blackwood, Hodge & Company, Limited, manufacturers of heavy earth-moving equipment, etc., of Northampton, is attributed by the chairman, Mr. B. Sunley, very largely to political factors. Group profits declined from £656,732 to £572,244.

"In the home market the decision to restrict open-cast coal mining created a serious situation, not only for open-cast mining contractors, but also for equipment distributors and plant hire operators such as ourselves," says the chairman. "Equipment which had been purchased to maintain coal production at the levels fixed by earlier governmental policy announcements and, also, the organizations which had been built up for the maintenance and servicing of that equipment were, to a major extent, made redundant by this decision, which may politically have been wise but for which, economically, there could be no justification." Mr. Sunley says that the delay in carrying out the new major road development programme resulted in a large volume of road building equipment standing idle and in orders for new equipment being deferred.

The dividend is maintained at 6 per cent.

Personal

Mining Engineer's Golden Wedding

GOLDEN wedding anniversary of Mr. and Mrs. JOSEPH STAFFORD, of Hill House, Ashover (Derbyshire), is to be celebrated tomorrow (Saturday). Mr. Stafford is well known in mining circles and was, until his retirement in 1952, chief engineer of the North-Eastern Divisional Coal Board. He began his career with George Fletcher & Company, Limited, later serving with Barber Walker & Company, Limited, as resident engineer at Eastwood, Bentley, and Harworth collieries. At Bentley he was responsible for colliery, civil, and mechanical engineering and did major engineering work on flooding and subsidence. In 1941 he was appointed chief engineer of the Carlton Main Colliery Company, Limited, and on vesting date took up his last appointment.

Since his retirement Mr. Stafford has retained an active interest in colliery engineering, being a director of Blacks Mining Equipment, Limited, Bromley (Kent), and serving in a technical consultative capacity to the Hunslet Engine Company, Limited. He is a member of the Institution of Mechanical Engineers, was chairman of its Yorkshire branch from 1939-40, and is now on the institution's membership committee, advising on matters connected with NCB candidates. He is a fellow of the Association of Mining, Electrical and Mechanical Engineers and was chairman of its Yorkshire branch in 1930.

Mr. CLIFFORD JONES, safety officer at Cortonwood Colliery (Yorks), has been appointed a magistrate for the West Riding of Yorkshire.

Mr. D. E. RADLEY, demonstrator in the Faculty of Engineering at Queens' College, Cambridge, has been elected into a research fellowship.

Sheffield Cutlery Manufacturers' Association has elected Mr. R. VINER, managing director of Viners, Limited, its president for the third year in succession.

President for 1960-61 of Normanton (Yorks) Rotary Club is Mr. H. P. A. JOHNSON, production manager of the Castleford Area, North-Eastern Divisional Coal Board.

Mr. CLIFFORD MACHIN, director of production for the North-Eastern Division of the National Coal Board, has been appointed a JP for the West Riding of Yorkshire.

Dr. DENIS TAYLOR, a director of Plessey Nucleonics, Limited, Northampton, was a guest speaker at a recent meeting of the Parliamentary and Scientific Committee to discuss the possibility of instigating a British space programme.

Mr. OMER G. VOSS, managing director of the International Harvester Company of Great Britain, Limited, since 1954, has recently returned to the USA for reassignment to an important position with the parent company, details of which have not yet been announced.

Because of a serious and prolonged illness, Mr. H. FORD is unlikely in the foreseeable future to return to duty as manager of the No. 1 Group of the South Staffordshire and Shropshire Area, West Midlands Divisional Coal Board, it is stated. As the post cannot be left unfilled indefinitely, the board has decided to advertise the vacancy.

Mr. E. W. H. HADFIELD, export manager of Ransomes & Rapier, Limited, engineers and iron-founders, of Ipswich (Suffolk), has left for a short tour of about three weeks in the Middle East. His trip will include visits to agents and potential agents in Lebanon, Jordan, Libya, Syria, and Egypt. Mr. Hadfield has spent a number of years in the Middle East in the past, his last visit being in 1956.

After 52 years in the coal-mining industry, Mr. A. K. JONES, training officer of the No. 6 (Monmouthshire) Area of the South Western Divisional Coal Board, has retired. Before nationalization, he spent most of his career in the Garw Valley Colliery (Glam) and was undermanager at the pit when he left to take up his appointment as training officer. Mr. Jones, who has been responsible for over 5,000 young trainees, received a presentation from the Area general manager, Mr. Lister Walker.

After eight years as honorary treasurer of the North of England Institute of Mining and Mechanical Engineers, Mr. F. P. MILLS has relinquished the office. He received a presentation to mark his retirement. Mr. Mills, until four years ago chief officer of the Durham and Northumberland collieries Fire and Rescue Brigade, served the institute as honorary secretary for 21 years before becoming treasurer. He is a past president of the North of England branch of the National Association of Colliery Managers and of the Institute of Fire Engineers.

Retiring from active business at the end of June is Mr. C. CHARLES BLEACH, managing director of the Concordia Electric Safety Lamp Company, Limited, Whitchurch (Glam). His son, Mr. JOHN BLEACH, will control the company as general manager. Mr. Charles Bleach is also managing director of Elcordia, Limited, London, S.E.1, and the London Platinum Screw Manufacturing Company, Limited, Cardiff, and a director of Rimer Manufacturing Company, Limited, Pontypridd; Sargrove Electronics, Limited, Hounslow (Middx); and T. E. Lewis (Engineers Agents), Limited, Cardiff.

Mr. W. T. JONES, manager of Northern United Colliery (Glos) for the past three and a half years, is taking up an executive appointment with the Drilco Division of Atlas Copco (Great Britain), Limited. He has been in the coal industry for the past 30 years, starting at the coal face in various pits before he became under-manager of Eastern United Colliery (Glos) in 1950. He served there for a year as a manager before transferring to Northern United in 1956. Mr. Jones was awarded the BEM for his part in a rescue at Cleeve Hill Colliery in 1957, when he rescued a man trapped in a narrow crevice. He was invited to join the Inspectorate of Mines in 1957 but declined for personal reasons.

TRACTOR FACTORY'S FOUR-NIGHT WEEK

MANAGEMENT of the Massey-Ferguson tractor factory at Coventry has agreed—with the introduction of a 40-hour week today (Friday)—to the complete elimination of the Friday nightshift and to the operation of four nightshifts of 10 hours each.

This is an important precedent for the future pattern of nightshift working in the general engineering industry, in which working hours recently have been reduced from 44 to 42 a week.

An unofficial movement has developed in general engineering which favours precisely the same nightshift arrangements as had been accepted by Massey-Ferguson.

British Blast Furnaces in the March Quarter, 1960

(These tables are published through the courtesy of the British Iron and Steel Federation.)

Derbyshire, Leicestershire, Notts, Northants, and Essex.

Name of firm.	In blast at end of the fourth quarter, 1959.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Ford Motor	—	—	1	—	1	1	1
Holwell Iron	—	—	1	—	1	1	4
Renishaw Iron	—	1	1	—	2	2	2
Sheepbridge	—	2	—	—	2	2	2
Stanton Ironworks: Stanton-by-Dale	—	1	4	—	5	4.2	5
Staveley Iron & Chemical	—	—	4	—	4	3.1	4
Stewarts and Lloyds: Corby	—	4	—	—	4	4	4
Wellingboro' Iron	—	2	—	—	2	1.5	3
TOTAL	—	10	11	—	21	18.8	25

Lancashire (excl. N.-W. Coast), Denbighshire, Flintshire, and Cheshire.

Brymbo Steel Works	—	1	—	—	1	1	1
Darwen & Mostyn Iron	—	—	—	1	1	1	2
Lancashire Steel Manufacturing	—	2	—	1	3	2.5	3
Summers, John	—	2	—	—	2	2	2
TOTAL	—	5	—	2	7	6.5	8

North-West Coast.

Barrow Ironworks	2	—	—	—	2	2	4
Charcoal Iron	—	—	1	—	1	1	1
Millom Hematite Ore & Iron	2	—	—	—	2	2	3
United Steel: Workington	3	—	—	—	3	3	3
TOTAL	7	—	1	—	8	8	11

Lincolnshire.

Appleby-Frodingham Steel	—	4	—	—	4	4	4
Lysaght's Scunthorpe Works	—	3	—	—	3	3	3
Thomas, R., & Baldwins: Redbourn	—	3	—	—	3	3	3
TOTAL	—	10	—	—	10	10	10

North-East Coast.

Consett Iron	—	3	—	—	3	3	3
Dorman Long (Steel): Acklam	—	2	—	—	2	2	4
Redcar	—	—	—	—	—	—	2
Bessemer	—	1	—	1	2	1.4	3
Clay Lane	—	2	—	—	2	2	2
Gjers, Mills	2	—	—	—	2	2	3
Normanby Iron Works	—	—	—	—	—	—	3
Skinningrove Iron	—	2	—	—	2	2	3
South Durham Steel & Iron: West Hartlepool	—	2	—	—	2	2	3
Cargo Fleet	—	2	—	—	2	2	3
TOTAL	2	14	—	1	17	16.4	29

Scotland.

Bairds & Scottish Steel: Gartsherrie	1	1	—	—	2	2	4
Carron	—	—	1	—	1	1	2
Colvilles: Clyde Iron Works	—	2	—	—	2	2	3
Ravenscraig	—	1	—	—	1	0.9	1
TOTAL	1	4	1	—	6	5.9	10

South Wales and Monmouthshire.

Guest Keen Iron & Steel: Cardiff	1	2	—	—	3	3	4
Thomas, R., & Baldwins: Ebbw Vale	—	3	—	—	3	3	3
Steel Company of Wales: Margam	—	5	—	—	5	5	5
TOTAL	1	10	—	—	11	11	12

Non-ferrous Metals

Rumours of Tin Stockpiling

TIN has been the most active market in London and prices have fluctuated more widely than for some time past. Part of this activity is said to be due to dealers covering bear positions.

But part also can be attributed to tinplaters in the US taking more active interest in the market. In London stocks are ample and at the end of last week totalled 8,603 tons.

However, metal is reported as being short on the Continent where Belgian interests are reported to be building up stockpiles as a hedge against a possible dislocation of supplies from the Congo after it becomes independent at the end of this month.

The United Nations Tin Conference continued its series of closed meetings last week to consider the conclusion of an agreement to come into force when the present International Tin Agreement expires on June 30, 1961.

The conferences are expected to go on until the end of the month.

In the US the tone of the market has maintained its recent improvement and the price is over $1.01 a pound.

Copper Quiet

Copper is quiet but firm in London with the backwardation now around £5 a ton. Consumer interest is reasonably good and the only factor of significance at the moment is the uncertainty concerning the future of copper supplies from the Congo again because of the country's coming independence.

In the US custom smelters still report

business as slow but deny that a price reduction is imminent. Producers are experiencing satisfactory demand and the price of 33 cents a pound is applicable to both producers and custom smelters.

Lead is quiet in London and with the market subject to some selling pressure, prices have drifted to below £75 a ton. US market is also quiet and the price is unchanged at 12 cents a pound.

Zinc is quiet on both sides of the Atlantic with the price in London fluctuating narrowly around £90 a ton while in the US the quotation is unchanged at 13 cents a pound.

Official metal prices in London yesterday (Thursday) were:—Copper, Standard: Prompt £251 10s., forward £246. Tin, Standard: Prompt £797, forward £790. Lead: Prompt £73 5s., forward £73 17s. 6d. Zinc: Prompt £90, forward £90 10s.

British Blast Furnaces in the March Quarter, 1960—*continued*

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of fourth quarter, 1959.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Goldendale Iron	—	—	1	—	1	1	2
Shelton Iron & Steel	—	3	—	—	3	3	3
Stewarts and Lloyds: Bilston	—	1	—	—	1	0.6	2
TOTAL	—	4	1	—	5	4.6	7
Sheffield.							
Park Gate Iron & Steel	—	2	—	—	2	2	2
GRAND TOTAL	11	59	14	3	87	83.2	114

Weekly Average Number of Furnaces in Blast during the March Quarter, 1960, and the Previous Four Quarters

District.	1959.				1960.
	March.	June.	Sept.	Dec.	March
Derby, Leics., Notts., Northants, and Essex	20	18.8	17.7	17.6	18.8
Lancs. (excl. N.-W. Coast), Denbigh, Flint, and Ches.	6.9	7	5.8	4.7	6.5
Lincolnshire	8	8	8	8.5	10.0
North-East Coast	17.4	17	15.6	16.1	16.4
Scotland	6	5.8	5	5.8	5.9
Staffs., Shrops., Worcs., and Warwicks.	4.9	4	4	4.6	4.6
South Wales and Monmouth	9.5	9.6	9.6	11	11.0
Sheffield	2	2	2	2	2.0
North-West Coast	7.4	7	6.6	7.4	8.0
TOTAL	82.1	79.2	74.3	77.7	83.2

The following companies have furnaces in course of construction or rebuilding:—Lancashire Steel Manufacturing; Lysaght's Scunthorpe Works; South Durham Steel & Iron Company, West Hartlepool Works.

Clean Air Standards Should be Lowered Slightly

CLEAN air measures had reached the stage where industry was virtually being bullied by State officials, members of Birmingham Non-Ferrous Metals Club were told by a leading designer of anti-pollution equipment, Mr. R. M. Drummond, at its luncheon on Thursday of last week. Mr. Drummond said that it was virtually impossible for a business to work to the degree of tolerance now being fixed unless it had not less than £1,000,000 invested capital. He suggested that standards should be lowered a little to leave money for research.

Industrialists who had installed anti-air pollution plant ought to learn from their contractor how far they would be relieved of interference from authority, what the installation cost would be, and, most important, what the day-to-day costs of running and maintenance and the man-hours involved would be.

PLATE MILL, complete with auxiliary equipment, has been built for the Oxelösunds Järnverks, AB, Oxelösund, Sweden, by the Düsseldorf firm Schloemann, AG. The plant is laid out for a monthly production of 30,000 to 35,000 metric tons of steel plate. The four-high reversing mill has a barrel length of 12 ft. The finishing line consists of a hot leveller, two cooling beds with plate turnover, and shear line with four rocking shears, as well as piling and mechanical handling equipment.

Coal "A Trade of the Past"

"COAL shipping and exporting from this country, which was our original business, must regrettably be considered a trade of the past," states the chairman of Lambert Bros., Limited, Mr. Rattcliff Steel, in his annual report. Notwithstanding all mining improvements, he said, there was still no chance of competing with other countries where coal deposits had more recently been developed and where mining conditions, labour costs, and overheads generally were more favourable. Apart from this, the advent of oil had obliged many former coal consumers to convert their furnaces to oil—particularly in shipping.

Mr. Steel said that the Atlantic islands' depôts, with which the company was associated, had been very active and the results had been satisfactory. Coal stocks were still maintained, but as at all other bunkering ports, the demand was gradually ceasing.

Consolidated net profit for 1959 was £244,159 (£231,647), after tax of £142,475 (£165,984), and the final dividend of 17½ per cent. makes 22½ per cent. for the year.

TUBULAR steel lattice tower 120-ft. high, complete with helicopter landing deck, to protect well-head columns of new underwater oil wells being drilled in the Persian Gulf is being made at the Newport (Mon) works of Tubewrights, Limited.

Obituary

Mr. K. F. GORANSSON

THE death took place in Sweden last week of Mr. Karl Fredrik Göransson, chairman of the board of Sandvik Steelworks from 1939 to 1959. He was the grandson, and only surviving direct male descendant, of G. F. Göransson who was the first man successfully to exploit on a commercial basis the Bessemer process of steelmaking.

Mr. Göransson was director of Jernkonteret (Swedish Ironmasters Association) from 1928 to 1949, chairman of the Swedish Federation of Industries from 1939 to 1942, a past president of the Swedish Academy of Science, and a member of the Scientific Society of Upsala.

Mr. DAVID BRADFORD, an instructor at the National Coal Board training centre at Kames Colliery (Ayr), has died at the age of 51.

The sudden death occurred last week of Mr. ARTHUR WAINWRIGHT KAYE, managing director of Joseph Kaye & Sons, Limited, manufacturers of oil cans and cabinets and architectural and railway locks, of Leeds. He was 59.

Works manager of R. W. Crabtree & Sons, Limited, the Leeds firm of rotary newspaper press manufacturers, Mr. WILLIAM E. PEEL has died. He was 69. Mr. Peel, who was appointed works manager six years ago, had served with the company for 27 years. He was made MBE for his work at Crabtree's during the second world war on fire control and gunfire directors.

Recent Wills

ROSE, A. G., retired colliery agent, of Wigan (Lancs) £17,246

STEPHENS (or GANZ), S. S., for many years associated with shipping and coal exporting through Swansea Docks £6,192

PIRIE, CMNDR. W. B., former chairman of A. Kershaw & Sons, Limited, precision engineers, of Leeds, and a director of a number of companies £112,387

GREEN, G. H., chairman of Eliza Tinsley & Company, Limited, manufacturers of chains and builders' ironwork, of Old Hill (Staffs) and a past president of the Edge Tool Manufacturers' Association ... £206,924

GILL, WILLIAM, former director of the Spencer Wire Company, Limited, Wakefield; Pearson & Moody, Limited, coal merchants, etc., of Dewsbury, and of the Birkenshaw Collieries Company, Limited, prior to nationalization £35,641

DERBYSHIRE, THOMAS, associated with the coal-mining industry in Lancashire for over 60 years. He played an important part in the reopening of Ellerbeck Colliery in 1932 and was its manager until his retirement in 1956 ... ... £1,613

EDWARDS, SIR TRISTRAM, honorary president and former chairman of Smith's Dock Company, Limited, Middlesbrough, director of the Consett Iron Company, Limited, and other companies, and a past president of the Shipbuilding Employers' Federation £3,818

EXPORTS of British tractors for the first four months of this year were 53,522 compared with 37,786 in the same period last year, a rise of some 40 per cent., according to the Agricultural Engineers' Association.

LORD CHANDOS, chairman of Associated Electrical Industries, Limited, opened the new factory of Carbide Industries, Limited, at Maydown, near Londonderry, on Wednesday. The factory will produce calcium carbide and acetylene.

Engineering Apprentices Reject Employer's Offer

OFFER by the employers of increases in the minimum rates of more than 100,000 apprentices and other youths in the engineering industry have been rejected by the Confederation of Shipbuilding and Engineering Unions. In his reply to the union's claim, Mr. B. Macarty, director of the Engineering and Allied Employers' National Federation, said that it did not agree that there was any justification for a general increase to all young workers in the industry regardless of the current contents of their wage packets. They could not accept that the only and final yardstick should be minimum rates, which in most cases were merely a factor in a calculation.

The unions rejected the offer because of a condition that those already earning more than the new minimum rates would not benefit except in their holiday payments, overtime, and other premiums. They could not accept the principle that any should be excluded from an increase because of earnings based on payment by results.

The employers' federation is to report back to its management board which will decide whether it is desirable to consult the membership again. Apprentices from all over Britain are to meet in Glasgow tomorrow (Saturday) to decide what action they will take.

Further Orders for RTB's Spencer Works

THREE contracts, totalling £800,000, have been announced in connection with the new Spencer strip mill of Richard Thomas & Baldwins, Limited, at Llanwern. Brookhirst Igranic, Limited, a member of the Metal Industries, Limited, group, is to supply 23 sets of electrical controls for cranes at the works, a contract which is worth over £100,000.

The order for the design, supply, fabrication, erection, and testing of coke ovens and blast-furnace gas mains, believed to be in the region of £200,000, has been placed with Redheugh Iron & Steel Company, Limited, Gateshead. The side cladding of the factory at a cost of £500,000 is to be undertaken by the Cellactite Company, Limited, Gravesend. In order to reduce transport costs, Cellactite is to set up a special plant on the site at Newport.

Clyde Dry Dock Offer is Generous, Says Marples

THE Government's offer towards the cost of the proposed £4,750,000 graving dock for the Clyde was the most generous offer made to any dry dock in the country, said Mr. Ernest Marples, Minister of Transport, in Glasgow, on Monday. "The ball is firmly in the court of the Firth of Clyde Dry Dock Company—the initiative doesn't lie with the Government at the moment," he said.

During his two-day visit to Clyde shipbuilding and shiprepairing firms. Mr. Marples was shown berths in John Brown's shipyard which would be suitable for the new Cunarder to replace the Queen Mary. Following his Glasgow visit, he went on to visit shipyards in the North-east of England.

Let ATLAS COPCO take the load

... in mining and contracting

T2GH Auto-Loader

Air-powered Loaders and Dumpers for every underground requirement

Headroom, track gauge, car size, clean-up range ... you take all these into consideration before you buy loaders! That's why you should know about the Atlas Copco range. This includes loaders and dumpers to meet every requirement in underground work and to handle all kinds of muck—abrasive, sticky or free-running—with equal efficiency.

Auto-Loaders

T2G and T2GH auto-loaders allow one man to carry out the complete mucking operation—loading, transporting and dumping. As a result, labour costs are considerably reduced. Fitted with pneumatic tyres, these highly manœuvrable loaders put up excellent performances in both confined spaces and wide areas. Maintenance costs are lower as the rubber tyres help to reduce stress on the loaders. The T2G dumps directly into chutes or ore pockets, whilst the T2GH has a greater dumping height allowing it to discharge directly on to conveyors.

LM Loaders (rail-mounted)

Loaders in the LM series have bucket capacities ranging from 4 to 21 cubic feet and clean-up ranges from 6′ to 12′ 5″ (1.8 to 3.8 m.) without side-ploughs. The medium-sized model of this series is the LM56. Fitted with pneumatic side-swinging and quick-action controls, this machine is designed to reduce operator fatigue and increase loading capacity. In fact, with a bucket capacity of 7 cubic feet and a clean-up range of 8′ 8″ (2.7m³), it has a loading capacity in excess of any other loader of comparable size!

WRITE FOR LITERATURE—Further information about Atlas Copco loaders and dumpers is given in a series of leaflets and folders—readily available on request. Write for copies to your local Atlas Copco company or agent or to the address below.

Sales and service in ninety countries

With companies or agents in ninety countries, Atlas Copco is the world's largest organisation specialising solely in compressed air equipment. Products include stationary and portable compressors rock drills, loaders, hoists, paint-spraying equipment and air tools of every description. Wherever you are, the international Atlas Copco group offers expert advice on the selection of equipment and provides a complete after-sales service.

Atlas Copco

COMPRESSED AIR ENGINEERS

ATLAS COPCO (GREAT BRITAIN) LIMITED

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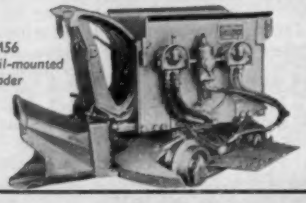
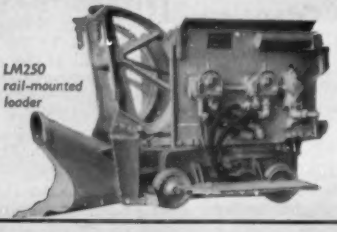
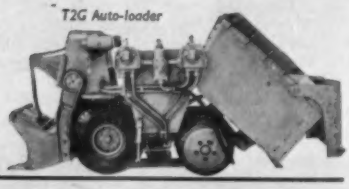


LM56 rail-mounted loader



LM250 rail-mounted loader



T2G Auto-loader

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D170

Coalfield News

AFTER 51 years at Dawdon and Blackhall collieries (Co. Durham), Mr. H. Dixon has retired from the industry at the age of 65.

AFTER extensive alterations to the underground haulage systems, Broomhill Colliery (Northumberland) has introduced a one-shift system. No redundancy has been caused by the change since workmen have been transferred to other collieries.

SEVERE FLOODING caused work to stop in a seam of Wharncliffe Woodmoor No. 2 pit, near Barnsley, on Thursday of last week. Technicians worked overtime pumping water from the 2-ft. seam, while miners were transferred to other parts of the pit.

MORWOOD COLLIERY, Haltwhistle (Northumberland) is to be closed on July 1. The pit employs about 190 miners, and after allowing for 30 men who will be retained for a time on salvage work and a number who will be transferred to other pits, 140 men will become redundant.

DONCASTER Rural District Council is to recommend support for the proposals made by the recent conference at Goldthorpe on colliery spoil heaps. The proposals include the setting up of a standing committee of local authority and mining representatives in affected areas and the control of spoil heaps to enable their reclamation and reintegration with the surrounding scenery.

EIGHT CANDIDATES have been nominated for the post of general secretary of the Yorkshire Area of the National Association of Colliery Overmen, Deputies, and Shotfirers, in succession to Mr. E. Lockett, who has become chief training officer of the North Eastern Divisional Coal Board. With two exceptions the candidates are secretaries of their respective branches. Votes will be returned to the Barnsley head office by July 11 and the result should be known five days later.

NATIONAL ARCHERY COMPETITION for mineworkers, organized by the Coal Industry Social Welfare Organization, was won at Durham recently by the East Midlands Divisional Coal Board team. They beat the team from the North-Eastern Division by one point with 1,853 points, and became the first team to win the Lady Bowman Challenge Trophy. The trophy was presented by Lady Bowman. Mr. C. Bradley, Derbyshire Paraplegic Miners, won the prize for the highest individual score.

New Road Opens Kinglassie Pit After Blockage

SURFACE mine at Kinglassie Colliery (Fife) became a safety lamp mine last week. The new order banning smoking followed changes made after a collapse which blocked No. 2 shaft some weeks ago.

To get the pit reopened, a road has been driven from the surface mine to the pit to provide the two means of exit stipulated by regulations. The "no-smoking" order came into force when the road was completed on June 8.

The road, over 200 yards long, involved continuous mining and was carried out by four teams of men working six-hour shifts. The 300 miners are now back to usual working. Shaftsmen are working in continuous shifts to reopen No. 2 shaft. The pit has been closed for 22 days.

NET PROFIT of the Mint, Birmingham, Limited, for the year ended March 31, was £38,138 and the dividend is raised from 10 to 12½ per cent.

Warm Wind of Trade for Coal

"A NEW wind is blowing through the coal trade. It is warm and comforting and is, in fact, a trade wind," said Mr. J. S. Williams, deputy director-general marketing, National Coal Board, on Monday. He was speaking at a Press conference in London at which the 1959 annual report of the Coal Utilization Council was presented. Mr. Williams, who is chairman of the CUC Publicity Committee, recently gave up the directorship of the CUC to take up the NCB post and the report was presented by his successor, Sir Campbell Hardy.

One of the most important contributions the CUC has made to the general public, Mr. Williams said, had been its constant preoccupation with formulating and maintaining high standards of quality and service to the trade and to the public on all aspects of solid fuel and solid fuel appliances in the domestic market. This had been done by concentrating on building up its educational and training facilities.

The new spirit in the coal trade had served notice on its competitors that in the battle ahead it was going to ensure that every householder would know the facts of the cheapness and efficiency of solid fuel burned in modern appliances.

Last year, thanks to increased income from the coal trade and the NCB, the CUC was able to launch a very substantial advertising campaign on a national basis. "We in the coal trade have a tremendous story to tell and we intend to tell it in all its comforting details," he said.

Sir Campbell Hardy, as a "new boy," said he had been struck almost immediately by the "new look in the coal trade." The vigorous and confident way in which it was tackling the battle for markets was a definite pointer to the future.

Another "pointer" was a guarded assurance given by Mr. Williams that in a few years people would be able to buy coal from slot machines. Experiments were now being carried out on these lines in Paris. The coal would probably cost about £3 a ton more than in bulk delivery but the machines could be installed outside merchants' premises or in the basements of blocks of flats.

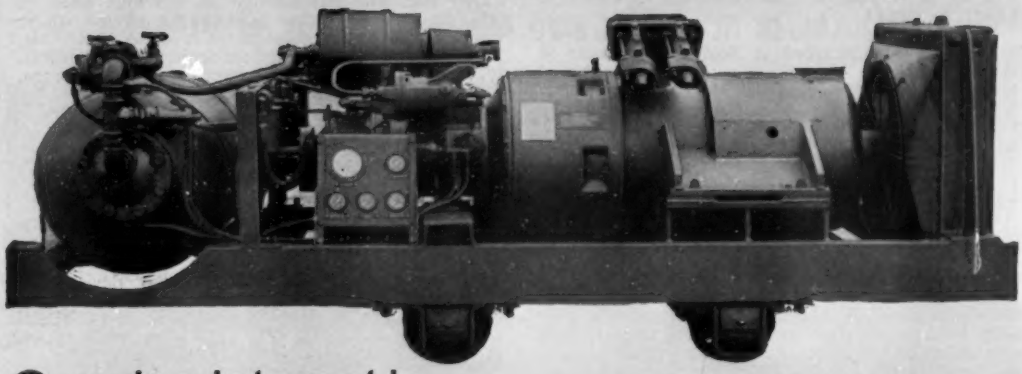
As at the conference, the main theme of the report is the all-out drive to put coal back into the forefront of fuels and even to those intimately concerned with the business of selling solid fuel and solid fuel burning appliances, the scope and effect, in the comparatively short time the campaign has been launched, of the CUC's work is impressive.

Appeal Against Closure of South African Mine

REQUEST has been made by South African Coal Estates, Limited, at Witbank, Transvaal, for a commission to be set up without delay to hear an appeal against the closure of five sections of the mine. The order to close the sections was given by the Inspector of Mines at Witbank, Mr. W. T. Dalling, a mining engineer who gave evidence at the enquiry into the Coalbrook disaster earlier this year. His reason for the order was that coal was being mined across abandoned workings.

South African Coal Estates, a member of the Anglo American Corporation of South Africa, Limited, group, had an output of 1,500,000 tons last year.

COMPRESSED AIR UNDERGROUND



Growing interest in Rotary Machines

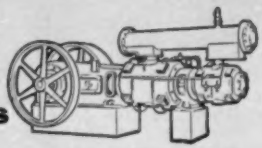
There is steady growth in the number of "Power Vane" rotary compressors in service underground.

Undoubtedly, the low temperature operation of the "Power Vane" is of particular interest to the mining engineer, as the discharge temperature is some 100°F lower than any equivalent reciprocating compressor. They can be air or water cooled to suit service conditions.

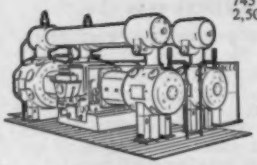
The simplicity of the rotary principle not only results in a substantial reduction in upkeep costs but at the same time permits the design of extremely compact units. This is illustrated in the above photograph of a special low-height mine-car "Power Vane" rotary compressor built for service in South Africa.

Full details of the standard air and water cooled Rotary stationary compressors are available on request.

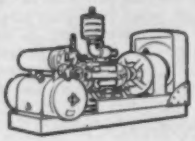
THESE ARE THE FOUR BASIC TYPES



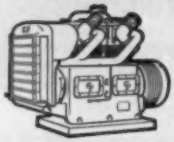
Class T straight-line, double-acting, single and multi-stage compressors for outputs up to 745 c.f.m. or pressures up to 2,500 p.s.i.



Class FE balanced-opposed multi-cylinder compressors for outputs up to 8,000 c.f.m. or pressures up to 3,000 p.s.i.



Class RE electrically driven Rotary Air Compressors for outputs up to 510 c.f.m. at 100 p.s.i.



Class P two-stage air-cooled compressors for outputs up to 477 c.f.m. at 100 p.s.i.

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Law Cases

Coal Board Appeal Allowed

THE Court of Appeal allowed an appeal by the National Coal Board against the amount of damages awarded by Mr. Justice Pearson at Liverpool Assize on April 17, 1959, to Mr. Alexander Mozer (36), a miner, of St. Helens. The award was reduced from £2,947 to £2,047.

Lord Justice Sellers said Mr. Mozer's arm was struck by a wire which snapped at Bold Colliery, near St. Helens. Although the arm was permanently weakened, Mr. Mozer was able to resume work, without loss of wages, afer 11 weeks. In the circumstances the trial judge's award was too high.

Lords Justices Pearce and Devlin agreed.

WIDOW AWARDED £5,000 DAMAGES

WIDOW, whose husband was killed in an accident at the Ebbw Vale works of Richard Thomas & Baldwins, Limited, was awarded £5,000 damages at Monmouthshire Assizes. Mr. Stephen Brown, for Mrs. Linda Patricia Hughes (42), said that a train of bogies or wagons used for carrying moulds was brought into the mould conditioning plant and Mr. Hughes went to assist in uncoupling two trucks. While he was doing so a crane pushed other wagons along the track and they crashed into the place where Hughes was working, killing him.

After the accident the company had introduced a warning system of klaxons which sounded when wagons were being moved. It had also laid down that only locomotives should move the wagons, Mr. Brown stated.

Giving judgment, Mr. Justice Thesiger rejected the suggestion made by the defendants, that Hughes had been guilty of contributory negligence. "I find, without hesitation, that the defendants, through the crane driver were negligent and were negligent themselves for failing to institute any safe system of control," he said.

MOULDER AWARDED £155

DAMAGES of £155 were awarded at West Bromwich County Court to Mr. James Vernon Nuttall (44), a moulder, for an injury received in an accident at the works of Izons & Company, Limited, iron-founders and holloware manufacturers, West Bromwich. Mr. Nuttall claimed that after pouring molten metal into a scrap hole, the metal broke through the wall of sand and burned his foot, causing him to be away from work for 10 weeks.

Judge E. G. H. Beresford said he was satisfied that the method of disposing of surplus molten metal was a safe one, but the metal had not been cleared from the scrap hole for some days, and this had caused the accident.

At Chester Assizes, Mr. Justice Glyn-Jones awarded £6,250 agreed damages and costs to Mr. Edward Oldfield (22), whose right arm was drawn between moving rollers at the Hawarden Bridge Steelworks, Shotton (Ches), of John Summers & Sons, Limited.

THE HEARING WAS BEGUN at Kirkcaldy Sheriff Court of an action for £1,500 damages brought by Mr. William Reid, a labourer, against the Melville-Brodie Engineering Company, Limited, Kirkcaldy (Fife). Mr. Reid, who was involved in an accident at the company's works, alleges it was due to the defendants' failure to comply with the Factories Act. The company denies liability. The case will be resumed on July 27.

DAMAGES totalling £4,555 were awarded to Mrs. Margaret Isabel Peacock, whose husband, Mr. Henry Peacock (36), was killed in a roof fall at a Skelton (Yorks) colliery three years ago. Mr. Justice Davies directed that the widow receive £2,000 and the remainder be divided between the four children.

ELECTRIC WELDER, Mr. Francis William Richard Carter (36), who claimed that he was hurt when he fell from a ladder after receiving an electric shock, was awarded £1,250 damages at York Assizes. Mr. Justice Davies entered judgment against the defendants, W. H. Smith & Company Electrical Engineers, Limited, Manchester.

New Chairman for Alloy Steels Association

ANNOUNCEMENT of the resignation of its chairman, Mr. W. E. A. Redfearn, has been made by the Alloy Steels Association. He is succeeded by Mr. R. Bavister, a director and commercial manager of Samuel Fox & Company, Limited.

MR. W. E. A. REDFEARN

Mr. Redfearn is a director of the English Steel Corporation, Limited, English Steel Rolling Mills Corporation, Limited, and managing director of the English Steel Forge & Engineering Corporation, Limited. He has been chairman of the association for the past 10 years. During the last war Mr. Redfearn was a member of Lord Beaverbrook's Aircraft Steel Dropforging Committee and the Drop Forgings Advisory Committee of the Ministry of Supply. From 1944 to 1949 he was chairman of the Heavy Steel Castings Association and last year he was elected chairman of the National Forgemasters' Association.

A past president of the National Association of Drop Forgers and Stampers, Mr. Redfearn has also been chairman of the Forging Ingot Makers' Association. He is a member of the British Iron and Steel Federation's council.

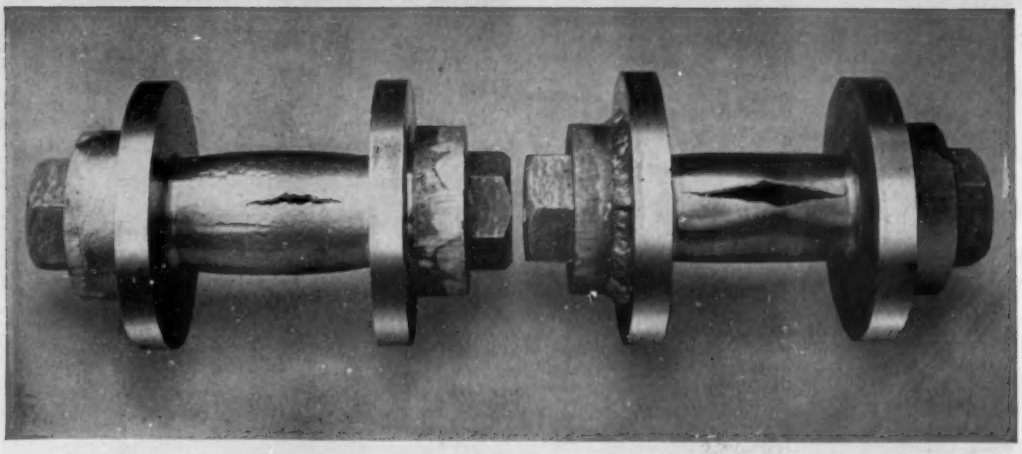
ALUMINIUM, LIMITED, WITHDRAWS US OFFER

OBJECTION by the US Department of Justice has caused Aluminium, Limited to withdraw its offer to purchase the Apex Smelting Company, of Chicago. The offer to acquire the assets of the American company was made last December, so that Aluminium could provide further facilities for US customers.

Aluminium's bauxite transhipment agency in Trinidad, Chaguaramas Terminals, Limited, has announced that it has completed long-term arrangements with Union Carbide, Limited, for the handling of manganese ore to be shipped from British Guiana to North America and Europe via Trinidad.

REMARKABLE PERFORMANCE OF ALUMINIUM BRONZE

0·10 IN. SHELL WITHSTANDS OVER 2 TONS PER SQ. IN.!



Recently we tested to destruction two similar hollow castings—one in gun-metal, the other in aluminium-bronze. The gun-metal had a wall thickness of **0·25 in.** and withstood pressures up to 4480 lbs. p.s.i.—a very good performance. The casting in aluminium-bronze burst at a slightly higher pressure (4816 lbs. p.s.i.) **but its wall thickness was only 0·10 in.** Surely an impressive demonstration of the weight/strength characteristics of this alloy.

We were one of the first foundries to cast in aluminium-bronze and to-day we supply castings in this alloy to customers all over the world.

* * * * * * * * * *

LEFT *Gun-metal* **0.25 in.** *thick—burst at* 4480 *lbs. per sq. in.*

RIGHT *Aluminium-bronze* **0.10 in.** *thick—burst at* 4816 *lbs. per sq. in.*

CASTINGS FROM A FEW OUNCES TO TEN TONS...

in all non-ferrous alloys. Precision machining. Specialists in aluminium-bronze, centrifugal-cast wheel blanks, shell moulded castings and chill-cast rods and tubes. Continuous cast phosphor-bronze bars up to 12ft. lengths.

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NON-FERROUS CASTINGS
HIGH-DUTY IRON CASTINGS
PRECISION MACHINED
BUSHES AND BEARINGS

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Orders Placed

AEI Motor for Samuel Fox

MOTOR and auxiliary drives for a new 40-in. reversing billet mill at the Stocksbridge works of Samuel Fox & Company, Limited, branch of the United Steel Companies, Limited, has been ordered from the heavy plant division of Associated Electrical Industries, Limited. The 5,000-h.p. d.c. motor will be supplied from a mercury-arc converter installation which has undergone trials in a similar mill at the works.

The converter consists of 10 grid-controlled pumpless steel tank units connected to give a 12-phase output of 4,000 kW. The reversal of the motor torque is actuated by a pneumatic switch in the armature circuit which also allows regenerated power to be accepted back into the a.c. supply system through the converter. Static amplifiers, sequence control system, and supervisory and alarm equipment will be mounted in cubicles on a gallery overlooking the motor room.

WILLIAM BOBY & COMPANY, LIMITED, water treatment engineers, of Rickmansworth (Herts), has been awarded a contract valued at £5,691 by the South of Scotland Electricity Board for the demineralization plant for Braehead Power Station.

PETROFINA (GREAT BRITAIN), LIMITED, has placed a contract with Whessoe, Limited, Darlington, for the supply and erection of an oil storage tank with a capacity of 5,000 tons on the Corporation Quay, Sunderland. This is the first stage of a development scheme planned in the area by Petrofina.

TRANSFORMER costing £250,000 for the Central Electricity Generating Board is to be built by the English Electric Company, Limited. Weighing 420 tons, it will be a 400 MVA transformer to be installed at the High Marnham end of a high voltage transmission line from High Marnham power station (Notts) to Monk Fryston, near Leeds. It will connect the 275,000-volt super-grid to this line, which will be uprated to 380,000 volts.

ORDER has been placed with Heenan & Froude, Limited, manufacturing engineers, of Worcester, by Brodogradiliste Uljanik, of Pula, Yugoslavia, for a hydraulic dynamometer capable of absorbing and measuring up to 20,000 b.h.p. at speeds ranging between 115-225 r.p.m. It will be used for testing large marine diesel engines which the Yugoslavian concern is making under licence from the Danish concern, Burmeister & Wain, Copenhagen.

IN A JOINT BID with the South Durham Steel & Iron Company, Limited, Stewarts and Lloyds, Limited, has obtained an order worth £650,000, from the Brazilian national oil company, Petroleo Brasileiro-SA-Petrobras, for a pipeline for the Guanabara Marine Terminal. The order was obtained through Brefcon, the consortium of British refinery equipment manufacturers, of which Stewarts and Lloyds is a member. Most of the pipeline, including the whole of Stewarts and Lloyds' share, has been despatched.

THE AMOUNT OF SHALE from miners' concessionary coal which is put into dustbins in the High Green and Tankersley areas of Wortley Rural District, near Sheffield, has caused complaints from refuse collectors, who say that the amount of heavy material is increasing their work. The council is to take up the matter with the NCB.

Cost in Coal of Whitsun

WHITSUN cost the coal mining industry about 1,100,000 tons, last week's output at 2,791,200 tons comparing with the previous week's 3,906,600 tons. However, comparing the figure with that for Whitsun last year the disparity is not so great—a matter of some 300,000 tons.

In the week ended June 4, consumers' stocks continued to rise and stand at 12,726,000 tons. The increase was general and most noticeable in merchants' stocks of house coal. Undistributed stocks, however, continue to climb and are now almost 34,000,000 tons.

Output per manshift at the face rose again in the week ended June 4 to 69.64 cwt. and overall was 28.02 cwt.

There were 603,900 wage-earners on colliery books on June 4, against 664,300 on June 6, 1959, the numbers engaged at the coal face being 230,700 and 258,100 respectively. Total absenteeism (all workers) in the week ended June 4 was 15.61 per cent. compared with 13.35 per cent. in the week ended June 6, 1959. Output at the face was 3.982 tons and overall 1.401 in the week ended June 4 compared with 3.736 and 1.350 tons in the week ended June 6.

The following table gives (in tons) the output of saleable mined coal by division in the week ended June 11, and the tonnage lost through all causes (holidays, disputes, and go-slows):—

Division.	Week ended June 11, 1960.		Week ended May 23, 1959.*
	Total output.	Tonnage lost.	Total output.
Scottish	358,200	3,500	383,300
Northern (N & C) ..	194,400	52,500	209,900
Durham	356,900	97,800	378,000
North-Eastern ..	454,200	364,500	498,500
North-Western ..	226,800	30,300	252,000
East Midlands ..	601,500	235,400	657,800
West Midlands ..	160,800	118,400	184,100
South-Western ..	259,200	112,900	289,100
South-Eastern ..	17,900	12,400	18,100
Great Britain—			
Deep-mined coal ..	2,629,900	1,027,700	2,870,800
Other deep-mined (including licensed mines) ..	39,300	—	42,400
Open-cast coal ..	122,000	—	201,400
TOTAL	2,791,200	1,027,700	3,114,600

* Whit Monday week.

Smokeless Zones and Retired Miners' Coal

CONCESSIONARY coal of retired miners or their widows who live in smokeless zones will be bought back by the North-Eastern Divisional Coal Board to allow them to obtain smokeless fuel instead, Wortley rural council (Yorks) was told last week, when the problem of mining pensioners who will be affected by the Chapeltown (Burncross) smoke control area was raised.

The council suggested that the same concessions should be made to retired miners as to working miners, and the board has agreed to this on a temporary basis, pending a national agreement on concessionary coal and smoke control areas.

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NEWS IN BRIEF

THE FOUR BRITISH YACHTSMEN who are racing each other, single-handed, across the Atlantic, have taken with them a kit of Sheffield tools, donated by Stanley Works (G.B.), Limited. The tools are to deal with the emergencies which may crop up.

CANADIAN SUBSIDIARY of W. E. Sykes, Limited, Staines (Middx), Sykes Tool Corporation, Limited, is to close its plant at Georgetown, Toronto, at the end of the month. It is the third British subsidiary in 18 months to close in the Toronto area.

Mrs. G. W. WELLS, wife of the managing director of the Appleby-Frodingham Steel Company, branch of the United Steel Companies, Limited, Scunthorpe, crowned 18-year-old Miss Mary Richards, a typist from the offices, Gala Queen at the annual gala on Saturday.

WITH THE WIDENING of activities of the company to include the manufacture of other machinery and equipment, the name of Barford Agricultural, Limited, tractor manufacturers, of Belton, near Grantham (Lincs), has been changed to Barford's of Belton, Limited.

SHORT-TERM LEASE on industrial premises of about 30,000 sq. ft. in Luton has been taken by Monsanto Chemicals, Limited, London, S.W.1. The factory is for the manufacture of Flamingo Foam polystyrene board, which is used as insulation material in factories and elsewhere.

LOAN OF $30,000,000 to the Kobe Steel Works, Limited, of Japan, by the Prudential Insurance Company of America is to be used, together with additional funds raised in Japan, in expanding the company's iron and steel production facilities to meet demand in South-east Asia.

PLANNING COMMITTEE of Glasgow Corporation is to acquire, subject to corporation approval, the site and premises of Wilson Pipe Fittings, Limited, iron-founders. The company is transferring its operations to its factory at Irvine. The Glasgow premises will be redeveloped over the next 20 years.

IN OUR REFERENCE last week to the display of the British Iron and Steel Federation at the British Exhibition in New York which opened on Saturday, it should have been stated that the exhibits illustrated the industry's post-war development programmes which, by 1962, will have cost £1,000,000,000.

UNITED STATES imports of steel mill products from Britain in the first quarter of this year were 96,055 tons, compared with 26,462 tons for the same period last year, the US Department of Commerce announces. Imports from all countries for the first quarter were 1,400,367 tons this year against 757,555 tons last year.

ONE-DAY CONFERENCE, designed to be "a practical guide for management decisions," is to be held in London by the British Institute of Management on July 20. The chairman of the conference is to be Mr. R. F. Hunt, deputy chairman of the Dowty Group, Limited, and president of Dowty Equipment Company of Canada, Limited.

AS PART of its visit to this country, the Tasmanian Industrial Development Mission was recently entertained at the London headquarters of the Firth Cleveland group of companies. The chairman of Firth Cleveland, Mr. Charles W. Hayward, acted as host to the mission which is composed of Government officials and industrialists.

RECENTLY appointed Stelvetite stockholders for the Stoke-on-Trent area, James & Tatton, Limited, iron and steel stockholders, of Hanley, Stoke-on-Trent, displayed Stelvetite plastic-coated sheet steel on their stand at the North Staffordshire Chamber of Commerce Jubilee Exhibition, Hanley Park, Stoke, from May 18 to June 4.

HIGH AUTHORITY of the European Coal and Steel Community has granted a further $140,000 to the research programme aimed at combating the brown converter-smoke menace. Another $83,500 has been granted by the Authority for research by the German Mannesmann AG and Windfrisch-Gemeinschaft concerns into ways of reducing steel production costs.

EXHIBITION of new electric locomotives, rolling stock and AC electrification equipment built for British Railways—most comprehensive of its kind yet staged in Britain—will be held at Battersea Wharf, near Chelsea Bridge, London, from October 3 to 9. It will coincide with the BR Electrification Conference in London, and will be opened by the Minister of Transport.

TWO-DAY annual meeting of the Electric Steel Makers' Guild in Sheffield this week included a visit to the English Steel Corporation, Limited, whose managing director, Mr. W. D. Pugh, is an honorary member of the guild and "fathered" its early days. Guest of the guild is Mr. Walter Patterson, a past president of the American Electric Metal Makers' Guild.

PRESENTATIONS for long service were made to members of the staff of W. Wesson & Company, Limited, steel strip rollers, of Wednesbury, during the company's annual outing recently. The managing director, Mr. L. Wesson, made the presentations to Mr. A. Robson (pricing department), Mr. B. Grainger (manager, cold rolling mill), Mr. H. Catell (master roll turner), and Mr. T. Grainger (cashier).

NEW COMPANY, Hird-Brown, Limited, Sale (Ches), has been formed to design and manufacture photo-electric controls. The company has absorbed the entire activities of Paton Bros. Engineering Services, Limited, Sheffield. Mr. T. Bryan Hird, formerly of Millspaugh, Limited, and Metropolitan-Vickers Electrical Company, Limited, and Mr. Roy Brown, also formerly of Metropolitan-Vickers Electrical, are to be the joint managing directors.

OFFICIALS of the north-eastern district of the British Fire Services Association were welcomed by Mr. J. H. Page, technical director of Ruston-Bucyrus, Limited, excavating machinery makers, of Lincoln, when the annual competitions of the association took place on the firm's sports ground last Saturday. The Reddaway shield for the district championship was won by Ransome & Marles "A" team, Newark, and the Gill Memorial Shield by British Timken "A" team, Duston.

AFTER 51 years in the mining industry, Mr. J. S. Barrass, manager of Crofton Mill Colliery in the Northern (N&C) Divisional Coal Board, has retired. His last official duty was to take the chair at the opening of the colliery's new pithead baths. Mr. Barrass started work in Lambton "D" Pit (Co. Durham) where he became master shifter and overman. For 17 years he was assistant manager of Silkworth Colliery (Co. Durham) and subsequently manager of Burradon Colliery (Northumberland) from 1940 until his appointment to Crofton Mill 10 years later. Mr. Barrass is interested in music and is a keen supporter of Cowpen and Crofton Colliery Band.